Chemical Week

May 12, 1956

Price 35 cents

Leader of the 20 mules, Pacific Coast Borax's Gerstley heads his firm up a new trail . . . . . p. 20

Warning to expansion planners: local property tax rates are rising all over the nation . . . . . p. 27

Keep it moving, keep it hot: One firm's secret for lining drums with polyethylene . . . . . p. 57

How much business did your foreign competition do in the U. S. last year? . . . . . p. 76

Tall oil output confounds the forecasters, races for 750 million lbs./year by '57 . . . . . p. 104

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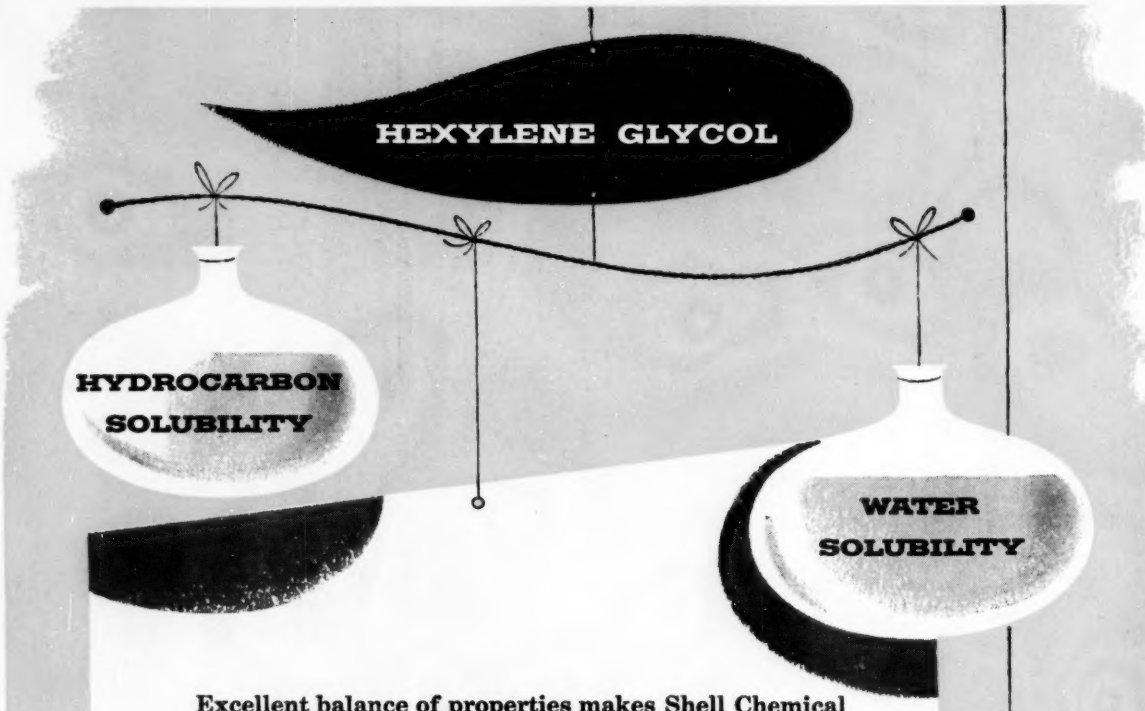

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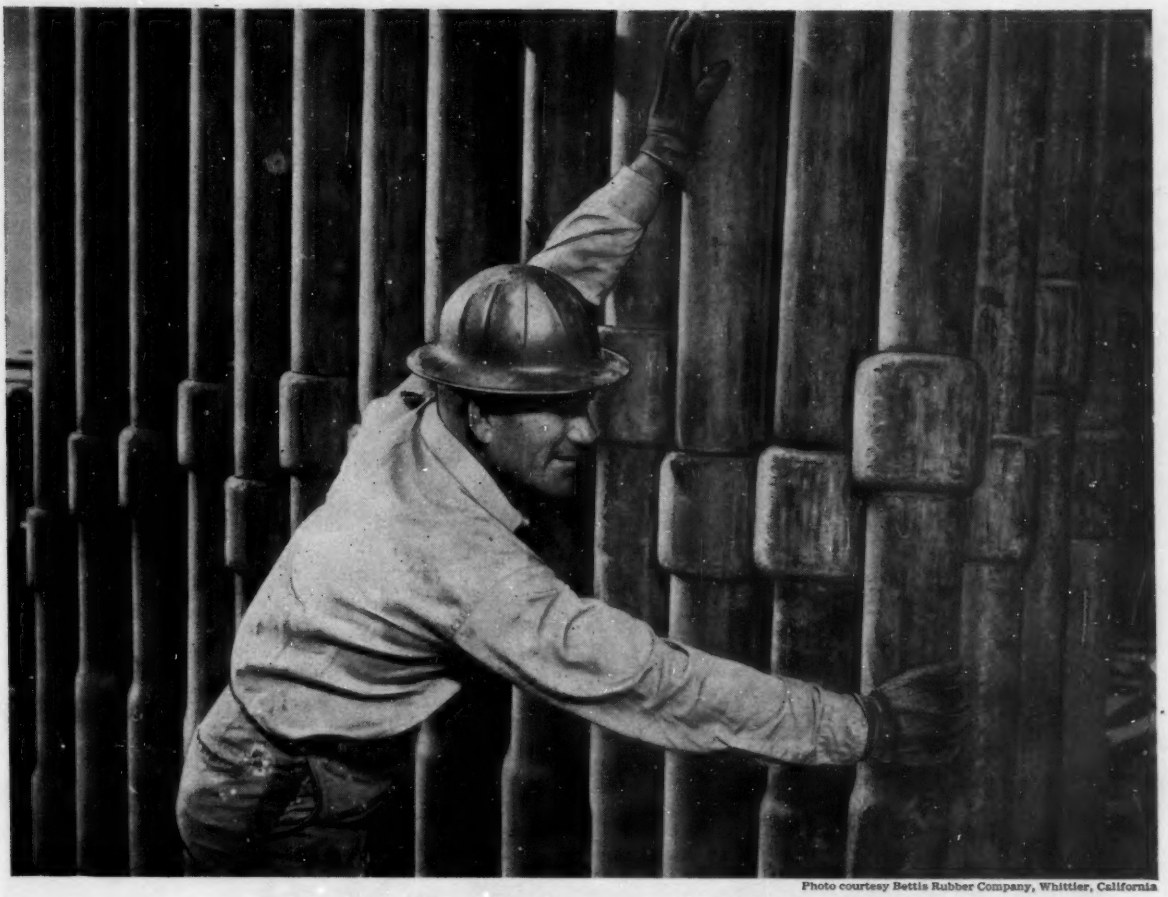

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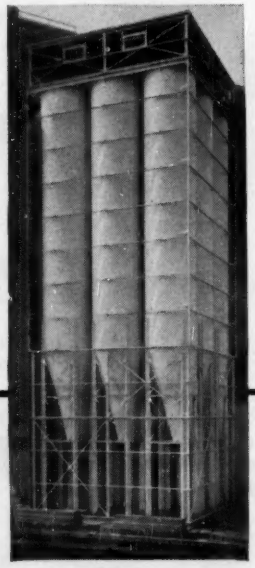

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Chemical Week

TOP OF THE WEEK May 12, 1956

Mexico's new sulfur industry puts in a determined bid for world markets .....p. 18

Zirconium: new AEC purchase contracts will put industry in on a massive scale. Here's who's involved, why, and how much they'll produce .....p. 22

Higher prices, 'stingless, greaseless' products lift profit potentials of personal antiseptics .....p. 40

National Research Corp.'s move into zirconium (p. 22) is latest of its 'new enterprises through research' p. 84

9 BUSINESS NEWSLETTER

14 OPINION

16 UPCOMING MEETINGS

18 BUSINESS NEWS

20 After 60 years, Pacific Coast Borax is returning to U.S. ownership. Here's why

24 WASHINGTON ANGLES

27 ADMINISTRATION
Local taxes are rising, play big part in chemical company expansion plans

30 Litigation took two years, but the 'star gems' controversy is over

New York teachers lay plans to attract more chemistry students

35 CHARTING BUSINESS

40 SPECIALTIES

42 FDA revises fees and its rules for determining safe pesticide levels

46 Dosimeters — specialties for safety — play big role in atomic work

57 PRODUCTION
Hot-coating process tumbles polyethylene linings into drums

60 Oxygen replaces electric power in BASF carbide pilot plant

73 TECHNOLOGY NEWSLETTER

76 SALES
Big switch in imports. Here's rundown on latest Commerce Dept. data

82 Armed Forces switch to new buying system — 'single manager'

84 RESEARCH

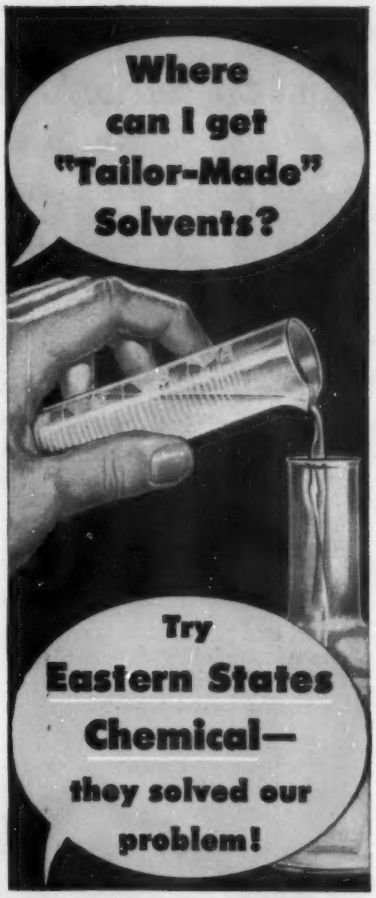
89 Squibb researchers synthesize reserpine

92 Nitroparaffins bid for fuel uses

99 MARKET NEWSLETTER

102 MARKETS
Commerce Dept. eases restrictions on trade with Soviet bloc countries

104 Tall oil output surged to 600 million lbs. in '55, up 50% in a year



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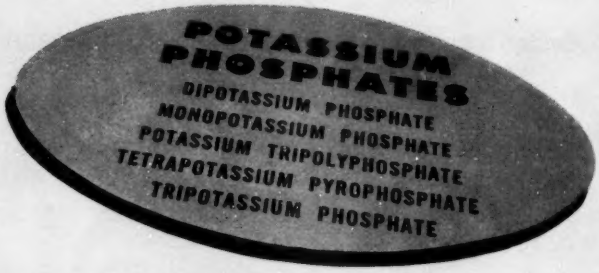

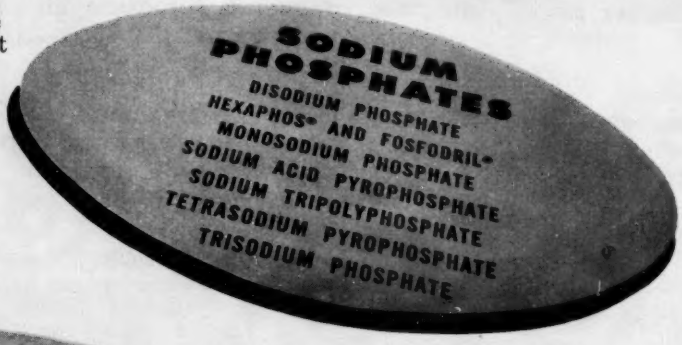

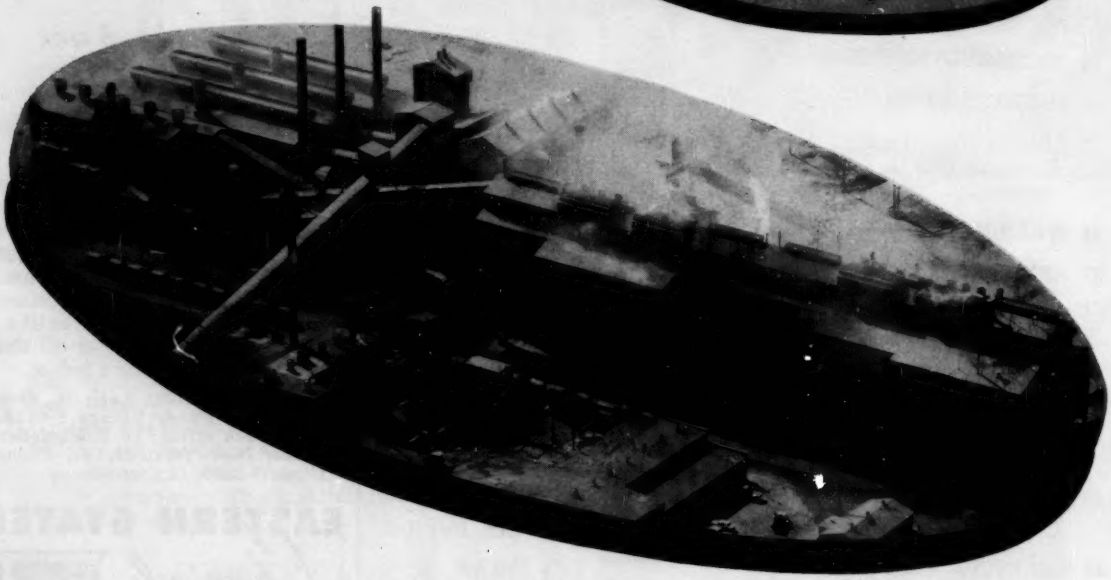

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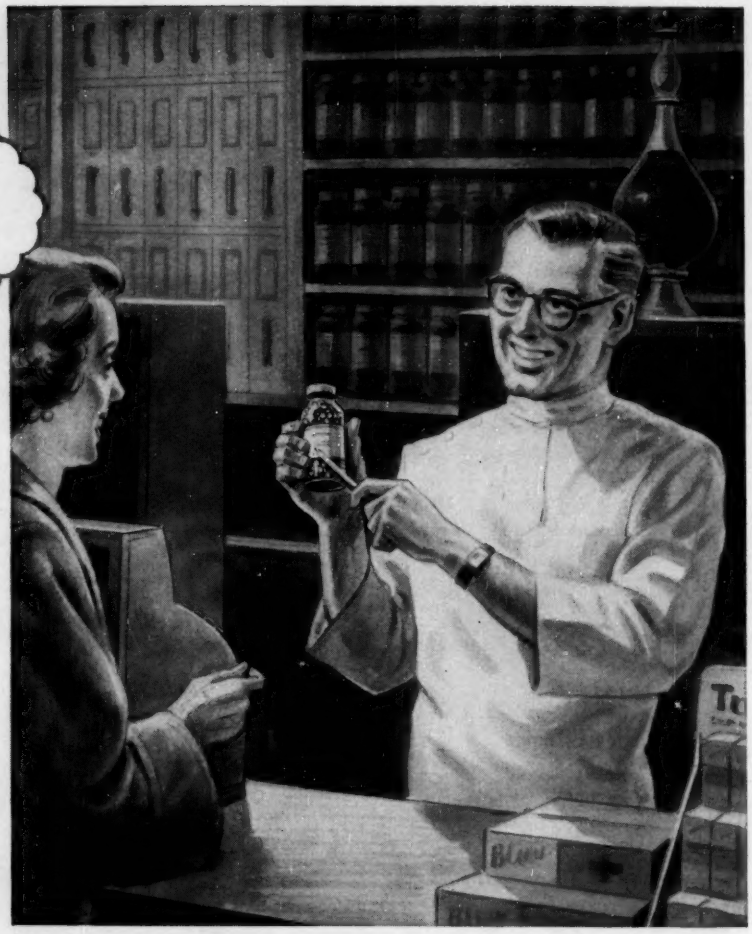

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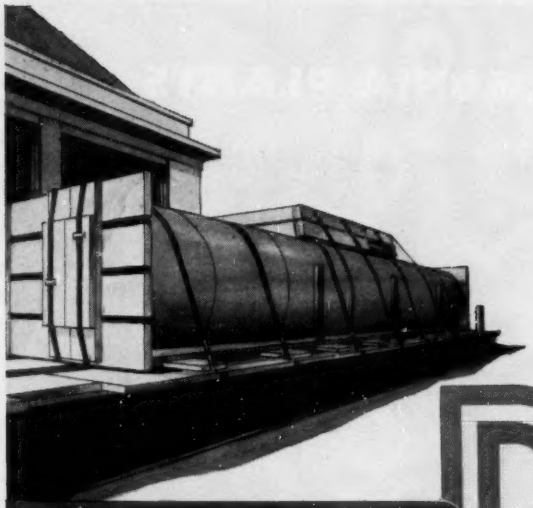

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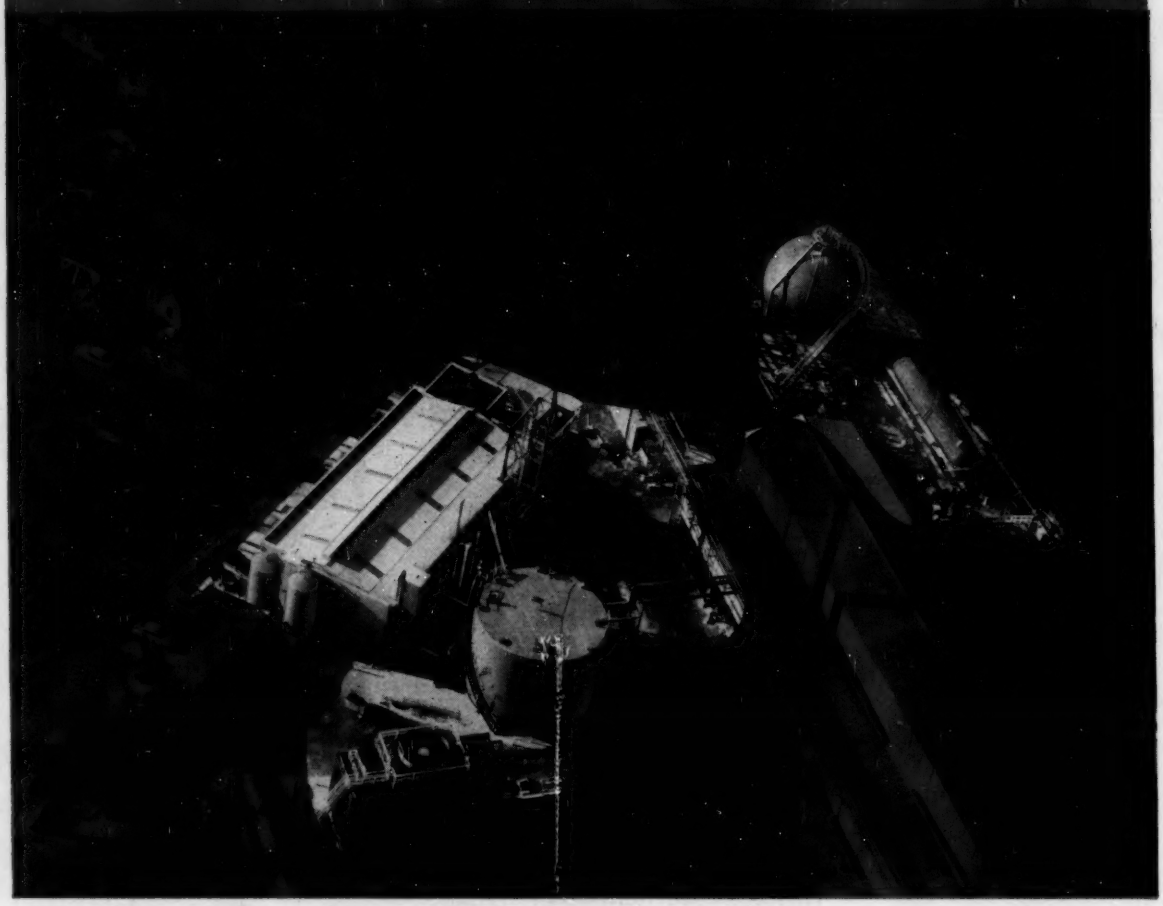

LUMMUS' 60 T/D UNIT FOR WESTVACO

One of the least expensive ammonia plants ever built went on stream in October 1955 at the South Charleston, West Virginia plant of the Westvaco Chlor-Alkali Division, Food Machinery and Chemical Corporation.

It is a small, automatic unit designed to operate with a labor force of two operators per shift, and produce 60 tons per day of anhydrous ammonia from waste chlorine cell hydrogen. Carefully designed and engineered for low investment and low operating costs, and incorporating all the latest safety features, the plant will have an unusually short payout time.

This small, minimum investment unit may well be the prototype for agricultural and industrial ammonia plants of the future. Because ammonia cannot be shipped over long distances, many such units, properly placed at hydrogen, natural gas, fuel oil and other sources throughout the country, would conveniently serve limited local areas.

Lummus built the plant around existing Westvaco facilities in an extremely confined area (as shown in the above photograph) without interrupting any normal plant operations, yet completed the job ahead of schedule in a brief seven months, with an excellent start-up. Westvaco was pleased with the job all along the line, from idea through operation.

This is one of four ammonia projects by Lummus in the last two years, and adds another to the 700-plus major installations completed by Lummus throughout the world.

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CHEMICAL WEEK
May 12, 1956

Antifreeze producers are in for an antitrust investigation. A U. S. grand jury, meeting in Danville, Ill., is reported to have subpoenaed records of some 74 companies that produce or distribute the materials. Included: virtually all ethylene glycol, methanol and ethanol producers, some distributors.

The probe is alleged to have had its start from complaints made by the Prairie States Oil and Grease Co. (Danville), which cans and distributes antifreeze under the White Star trademark. Firms in Detroit and Minneapolis-St. Paul are also reputed to have given evidence against the manufacturers. However, Earl Jenkinson, top Justice Dept. antitruster in Chicago, told CHEMICAL WEEK that there had "not necessarily" been a complaint filed to start the probe.

Under the current rules of judicial procedure, the Justice Dept. itself can not subpoena a company's records. Instead, by working through the U. S. Attorney in any federal judicial district, it can convene a grand jury, which, if it feels the situation is serious, may subpoena any records. The present subpoenas were returnable in court at Danville. The grand jury, which reconvenes on Tuesday, May 15, may bring a criminal antitrust indictment (based on evidence made available to it), which would then be prosecuted using normal court procedure.

The use of a grand jury presentment is now a standard Justice Dept. tool, because even if the jury refuses to indict, the department can then go ahead and file a civil antitrust suit, using such data. A bill is now awaiting Congressional action that would give the Justice Dept. subpoena powers, but there's little chance of passage this year.

Minutes of the soap company antitrust case are still being fought over. The "Big Three" soap companies won a victory (*CW Business Newsletter, April* 28) by getting a ruling that directed the Justice Dept. to show them the transcript of all testimony taken by a grand jury that investigated, and refused to indict, the companies. The firms—Colgate-Palmolive, Lever Brothers, Procter & Gamble—as well as the Assn. of American Soap and Glycerine Producers, were later brought into court on a civil antitrust charge.

But now, Attorney General Herbert Brownell has asked Federal Judge Alfred Modarelli to reconsider, in order to preserve the "integrity of grand jury processes against disclosure of its proceedings" so as to "encourage free and untrammeled disclosure by persons who have information of the commission of crimes." Argument on his petition is scheduled for May 24.

•

More expansion in titanium is ahead. National Distillers, which has just been awarded the biggest Atomic Energy Commission zirconium contract (*p. 22*), will announce "in about two months" that it plans to erect a commercial titanium plant at Ashtabula, O. It's studying, in addition, the use of its sodium-reduction process for preparation of such metals as thorium and beryllium. Beryllium sponge, incidentally, is directly suitable for fabrication by powder metallurgy techniques.

•

Syntex, the Mexican steroid firm, has a new owner. It's been acquired by the Ogden Corp., a New York holding company, which also controls Com-

mercial Filters and which has acquired the Honan Crane filter division of Houdaille-Hershey Corp., and the filter division of Michiana Products Corp.

•

Capacity estimates on Wyandotte's proposed ethylene oxide-glycol plant may have to be upped. Industry sources had estimated that the Baton Rouge plant would have an oxide capacity of 20 million lbs./year, but now the company reports, in the prospectus that covers its proposed stock sale, that it has appropriated $8.6 million for purchase of land and construction of the oxide-glycol unit. Assuming normal costs, that would give Wyandotte a closer to 40-million-lbs./year facility.

Total Wyandotte spending in the Baton Rouge area may go as high as $30 million. At least, it has obtained a 10-year property tax exemption on such plant expenditures from the Louisiana State Board of Commerce and Industry.

•

Also going ahead with an expansion is Delhi-Taylor Oil. The company plans a $20-million potash mining and beneficiation plant at Moab, Utah. Shareholders were told at the company's recent annual meeting that the company hopes to report next year that work has actually begun.

It's believed, in Utah industrial circles, that the company will sink a shaft over 3,000 ft. to mine the potash, though the company won't confirm this figure. A Clint Murchison enterprise (*CW Business Newsletter, March 3*), the firm is generally credited with controlling all the important, commercially mineable potash reserves in southeast Utah's Paradox Basin.

•

A test run of a new union strike tactic has involved Olin Mathieson's E. R. Squibb Division. The first strike for Squibb in its 98-year history has stopped operations at two plants in New York City and one in New Brunswick, N. J. At issue: wages, fringe benefits, job classifications, and consolidation of research and production worker contracts at New Brunswick.

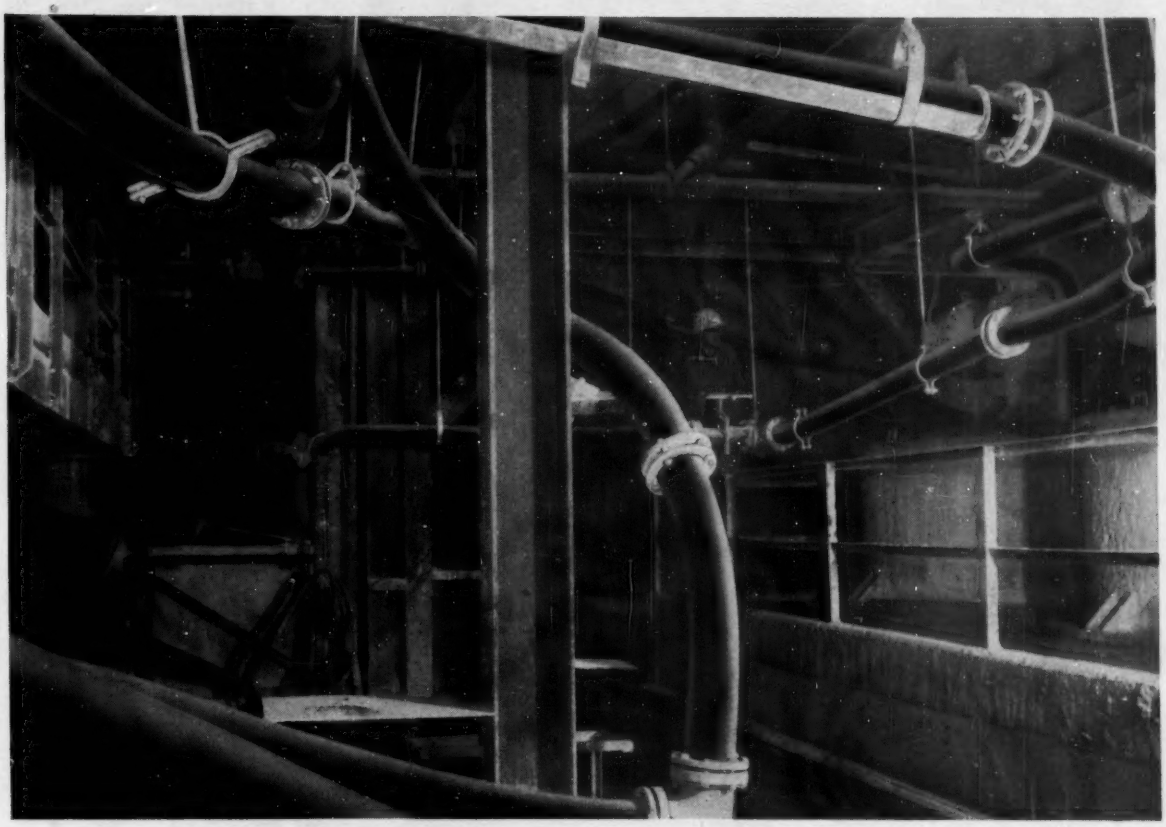
Significance: Bargaining on all four contracts is being handled as a unit by the Oil, Chemical and Atomic Workers Union's Squibb company council. The strike is probably the first one called to back up negotiations of such a council—which both the OCAW and the International Chemical Workers are touting as a major bargaining method for use in the chemical industry.

•

Another dispute involves Allied Chemical's Solvay Process Division. Here, the question is taxes. The company has filed a petition with the village of Solvay, New Syracuse, N. Y., asking review of its tax assessment. It thus joins Wyandotte and Dow (*see p. 27*) in contesting local property tax rulings.

The company says its properties are assessed at 46% of their fair value, while the rest of the property in the village is listed at an average of 25%.

"PUMPING IS SIMPLER AND PRODUCTION BETTER!..."



A production official of a phosphate chemical plant tells why he uses U. S. Pilot Flexible Pipe

"We change our production frequently, and the job is far simpler with U. S. Pilot® Flexible Pipe," continues the official. "This flexible hose can be strung anywhere it's needed. With metal pipes you have sharp corners. The flow tends to clog up at the first one, and then you've got a mess. But the gentle curving lines of U. S. Pilot Flexible Pipe make pumping simpler, and production better."

This performance of U. S. Pilot Flexible Pipe in a Florida Phosphate plant is characteristic. For handling corrosive chemicals and the abrasive action of transporting solids suspended in water, U. S. Pilot Flexible Pipe is highly economical. Because of its flexibility, it guards equipment from mechanical strains due to vibration, contraction, expansion and water-hammer. It serves as a cushion or insulator in eliminating the passage of shocks from one piece of equipment to another. Light in weight, easily and quickly installed.

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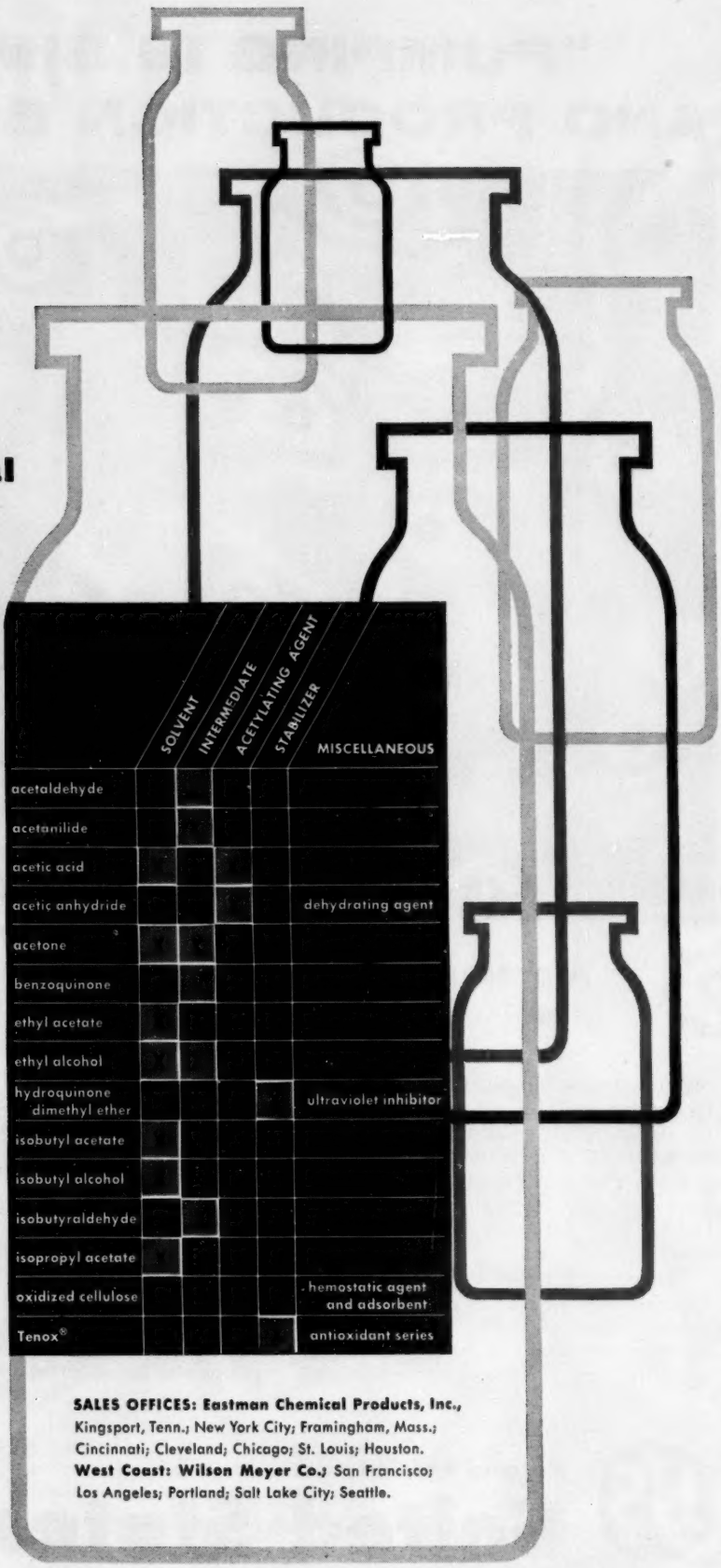

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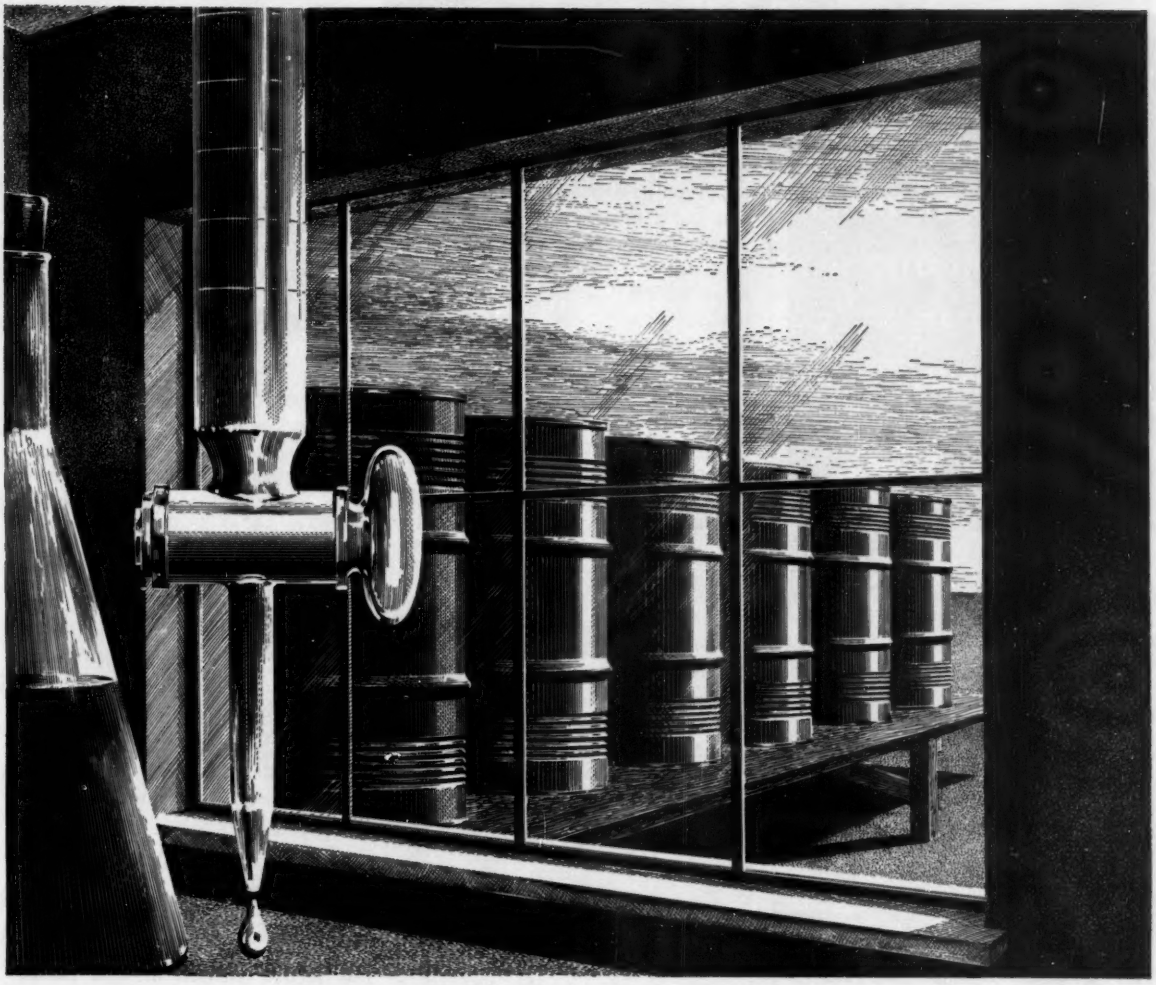
KINGSPORT, TENNESSEE
Subsidiary of EASTMAN KODAK COMPANY

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tenn.; New York City; Framingham, Mass.; Cincinnati; Cleveland; Chicago; St. Louis; Houston. **West Coast: Wilson Meyer Co.;** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.



Your QUALITY CONTROL can travel

Shipping in USS Steel Drums means maintaining your own rigid quality control measures right into your customer's plant. Special measures taken in the manufacture of USS Steel Drums make them able to act as a rolling Fort Knox, keeping your product clean and pure—all the way.

To protect your product against contamination, every drum-body, head and bottom is freed of ALL manufacturing dirt, grease and scale. With component parts virtually "hospital clean" the drum-parts are ready for the final step. This consists of applying all inside and outside surfaces with a special phosphate solution that inhibits rusting and serves as an excellent bond for external paint application. The USS Steel Drum is ready for its job of protecting your product from contamination.

USS Steel Containers are available in sizes from 2½ to 110 gallons . . . with a wide variety of special fittings and openings to answer any need. Always specify product-protecting USS Steel Drums.

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USS STEEL DRUMS

"It's Better to Ship in Steel"

UNITED STATES STEEL

OVER 100
MISSOURI
COMMUNITIES SAY:
"Let us 'tailor-make' a plant and more opportunity for you!"

Yes, you can write your own ticket in Missouri . . . your choice of industrial buildings listed in the latest "Missouri Quarterly Available Buildings Report"; your choice of twenty cities, large and small, which are ready and able to *tailor-make* your plant to your plans in "Organized Industrial Districts"; your choice of over 100 other communities willing to organize, acquire sites and build for you!

And Missouri doesn't send you . . . Missouri goes with you to the plants and the people in your own private exploration tour!

This personal, confidential service is the "extra ingredient" in Missouri's "Tailor-Made Industry Plan" which, exclusive of big national industry expansions, helped locate and build new plants totaling $136,000,000 in the "show me state" last year. And Missouri is rich in power, oil pipelines, gas, coal, industrial water, chemicals, minerals, forests, agriculture and recreation for good living and top production. Its unrivaled road, rail and water network make Missouri the crossroads of America.

But the biggest bonus Missouri offers is its different "Tailor-Made Industry Plan", which prepares the right community for the plant . . . then builds the plant to your plans! It will pay you to let Missouri show you first. For complete, confidential exploration,

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or write Dept. E685
James D. Idol, Industrial Director
Missouri Division of
Resources & Development
Jefferson City, Missouri

OPINION . . . . . .

Grange, Nitrotoluene

DEAR SIR: . . . One of our British affiliates, namely Grange Chemicals Ltd. . . . on page 16 (*April 7*) is shown as a producer of styrene. This is incorrect. Grange Chemicals Ltd.'s manufacturing activity is presently limited to the production of synthetic detergent alkylate of the quality produced in this country by Oronite.

In passing, I would like to question the statement made on page 18 under the head "Who's on First?" According to the authority on such matters, Dr. L. Gurwitsch, the first production of nitrotoluene from petroleum distillates occurred in the plant of Bensinwerke Renania and was performed on the petroleum distillate as recovered. There is no indication of any special concentration or the need for removing toluene from the motor fuel. In fact, at the time in question, mixtures of benzene and toluene were commonly used in the cars available.

H. E. BRAMSTON-COOK
Vice-President
Oronite Chemical Co.
New York

Ion-Exchange Deodorizer?

DEAR MR. JOHNSON: A challenge has been issued to the chemical industry in your "Target: Deodorant-Sterilizer for Air" (*March 31*). Some of the experimental work that has been done with ion-exchange resins suggests a possible solution of the problem presented in this article.

It is hereby suggested that a filter unit consisting of a combination of a *porous* cation-exchange resin and *porous* anion-exchange resin would provide adequate deodorizing and sterilizing for air conditioners. According to our experience, four of the five requirements you have listed would be met by this method. The porous exchangers will deodorize, they are nontoxic, noncorrosive, and nonflammable; they add neither heat nor humidity to the air stream, and the unit would certainly be simple and foolproof to operate. Of course, the exchange bed would not be a "fast-acting germ killer," although some microorganisms would certainly be filtered out. Perhaps a combination of a triethylene glycol bath and an ion-exchange filter unit would provide the required purification.

A number of years ago, ion-exchange plugs were tried as filters for tobacco smoke in our laboratory. These filters proved to be much too effective. They removed virtually all the aroma and flavor from the tobacco smoke. In work performed outside our laboratory, it was found that Duolite C-3, a phenolic cation exchanger, effectively removed amine and ammonia odors from air with surprising effectiveness.

We would be happy to discuss these ideas further with those responsible for the design of air-conditioning units. It is our hope, therefore, that . . . this letter be published . . .

I. M. ABRAMS
Associate Technical Director
Chemical Process Co.
Redwood City, Calif.

'Uncertainty Principle'

DEAR MR. JOHNSON: I am very pleased to see the recognition accorded (*April 7*) to the infant isotope industry.

Although Isotopes Specialties, one of our subsidiaries, is mentioned, it is unfortunate that the recent expansion of Nuclear Corp. of America's activities is not reflected in your list of isotope suppliers.

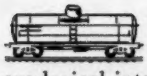
Nuclear Corp. of America, the first listed company dealing principally in peacetime applications of atomic energy, has a number of its operating subsidiaries engaged in the isotope business. Isotopes Specialties, mentioned in your article, manufactures and sells a wide range of labeled compounds; Nuclear Consultants, Inc. (St. Louis and New York) has been supplying radioactive pharmaceuticals to the medical profession for six years; Radioactive Products, Inc. (Detroit)

CW welcomes expressions of opinion from readers. The only requirements; that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

Low Cost Route to Many Products

ROHM & HAAS METHYLAMINES



As low cost sources of basic organic nitrogen, Rohm & Haas methylamines are logical intermediates in dozens of reactions. That's why they're so widely used in products of all descriptions: rubber-vulcanization accelerators, pesticides, surface-active agents, photographic developers, dyestuffs, pharmaceuticals, and quaternary disinfectants among others.

With Rohm & Haas methylamines, you also gain other important advantages:

- *Continuing Availability*—through large volume production in two separate plants.
- *High Quality*—the result of over 20 years' experience in producing amines.
- *The Right Amine*—mono-, di-, or trimethylamine; aqueous or anhydrous form; in drums, cylinders or tankcars.

Write today to Department SP for complete data.

Chemicals for Industry

ROHM & HAAS COMPANY

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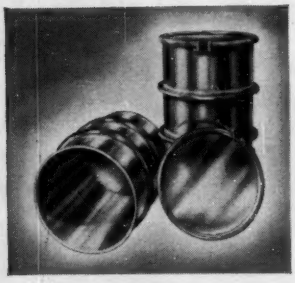
Representatives in principal foreign countries

as easy as re-sealing a pop bottle



Hackney removable head stainless steel drums protect shipments...open easily...close tightly

Here's the air-tight, liquid-tight shipping container that provides instant access to congealed or solidified contents.

Sealed with a gasket and quick-acting Toggle-tite (or single-bolt) closure, removable head covers top rim of barrel—protects product from contamination—is readily re-sealed when contents are not all removed at once. Crevice-free interiors are easily and quickly cleaned. Lightweight design saves shipping and handling money for you. Made in several standard sizes—in steel, stainless steel, nickel or nickel alloy.

Returnable Shippers for Every Need...

Removable head drums are just part of the complete line of Hackney lightweight returnable shipping containers for the chemical industry. Others are tight head drums, two-piece or three-piece acid drums, seamless bilged barrels, stainless steel 15½-gallon acid barrels. Send for complete Hackney Drum and Barrel Catalog.

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Manufacturer of Hackney Products

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Hackney MILWAUKEE DOWNINGTOWN IRON WORKS

CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS

has devised a number of practical industrial applications of radioactivity and has supplied the isotope requirements. In addition, Nuclear Corp. of America is engaged in a multitude of activities in the nuclear field, including radiation equipment manufacturing, consulting, and radiation applications.

Perhaps the "uncertainty principle" applies to Nuclear Corp., which has been expanding so rapidly that its position is rather hard to pinpoint. However, you can be assured of the permanency of its position in this new industry.

KENNARD H. MORGANSTERN
Executive Vice-President
Nuclear Corp. of America, Inc.
New York

SEE YOU THERE

American Coke and Coal Chemicals Institute, eastern regional meeting, Westchester Country Club, Rye, N. Y., May 14-15.

Design Engineering Show, Convention Hall, Philadelphia, May 14-17.

N.Y. State Society of Professional Engineers, 30th Engineering Industries Exposition and convention, Statler Hotel, New York, May 17-19.

Chemical Specialties Manufacturers' Assn., Inc., The Drake, Chicago, May 20-22.

National Assn. of Purchasing Agents, annual convention, Cleveland Public Auditorium, Cleveland, May 20-23.

Chemical Market Research Assn., meeting on "The Chemical Industry—Review and Forecast," Biltmore Hotel, New York, May 22-23.

American Society of Mechanical Engineers-Engineering Institute of Canada, joint meeting on guided missiles, Mount Royal Hotel, Montreal, May 23-25.

Chemical Institute of Canada, 39th annual conference and exhibition, Sheraton-Mount Royal Hotel, Montreal, May 28-30.

American Gear Manufacturers Assn., 40th annual meeting, The Homestead, Hot Springs, Va., June 3-6.

National Fire Protection Assn., 60th annual meeting, Hotel Statler, Boston, June 4-8.

Materials Handling Institute's Exposition, variety of new materials handling ideas and equipment on display, Cleveland Public Auditorium, Cleveland, June 5-8.

American Society of Quality Control, 10th annual meeting, Le Palais du Commerce (the Show-Mart), Montreal, Canada, June 6-8.

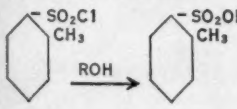
STEPPINGSTONES TO TOMORROW'S PRODUCTS

o-Toluenesulfonyl Chloride
98% pure *ortho* isomer
NEW TO INDUSTRY

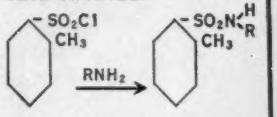
This pure *ortho* isomer—one of the most reactive of the substituted aromatics—can stop your struggles with mixed isomers. The pure *o*-toluenesulfonyl chloride boils at 126° C. (10 mm. mercury), is completely stable in storage, and non-corrosive when shipped—yet reacts like a typical strong acid chloride.

For example, the pure *ortho* isomer combines readily (and predictably) with alcohols, gives good reaction yields with any organic compound with active hydrogen. Examples:

WITH ALCOHOLS:



AND AMINES:



When you're building molecules for a particular use, from dyestuffs to pharmaceuticals; from plasticizers to pesticides—try *o*-toluenesulfonyl chloride.

COSMETICS

PLASTICIZERS

DYESTUFFS

HERBICIDES

Speaking of low cost... have you checked the economics of your process lately? You might cover yourself with glory, simply by comparing the costs on your present "building blocks" against another process based on bargain carload pricing of these standard Monsanto substituted aromatics—

ortho- and *para*-anisidine
benzenesulfonic acid, 70%
ortho- and *para*-dichlorobenzene
methyl *para*-toluenesulfonate
ortho- and *para*-nitrochlorobenzene
ortho- and *para*-phenetidine
sodium *meta*-nitrobenzenesulfonate
toluenesulfonic acid, tech. 94%
para-toluenesulfonylchloride
1, 2, 4-trichlorobenzene
toluenesulfonamides
2, 4-dinitroaniline
ortho-chlorophenol
ortho-chloroaniline
ortho-nitroanisole
benzyl chloride
para-nitrophenol
H acid

If the product or process you're planning calls for a substituted aromatic—contact your most reliable supplier—MONSANTO.

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Please send me:

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☐ Information on_____

Name_____ Title_____

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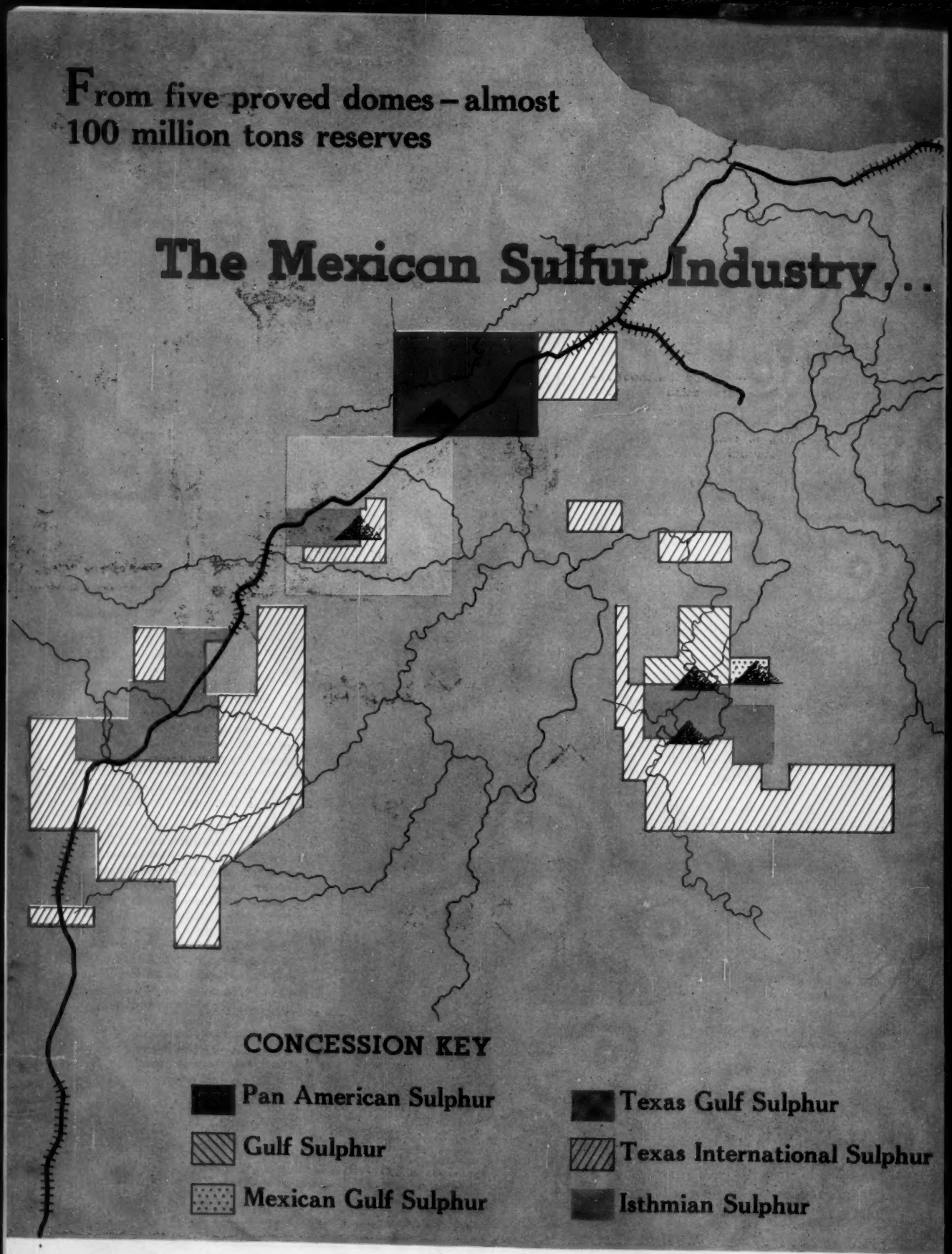
City_____ State_____

From five proved domes – almost 100 million tons reserves

The Mexican Sulfur Industry...



Chemical Week

May 12, 1956

...It's Ready to Compete for World Markets

New owners are taking over at Gulf Sulphur this week, as the company prepares for production from its first sulfur dome. Just ahead: Mexican production by U.S. king-pin, Texas Gulf Sulphur.

It may be the first step in a drive that ultimately will take Mexican sulfur producers to a pre-eminent position in world markets.

But U.S. companies will have an expanding domestic market to supply.

THE Isthmus of Tehuantepec, the narrow elbow of Mexico where the country bends east into Yucatan, is the source of the only Frasch sulfur mined outside of the United States. This week, the region (*see map*) had cause to celebrate. Sale, to New York and Houston investors, of the Brady brothers' controlling interest in Gulf Sulphur Corp. marked a transition point. It's now recognized as a good location for investment; no more is it a long-shot gamble.

For the Bradys—Lawrence, Ashton and William—the sale marked the fact that Gulf, which they had developed, is becoming big business as it begins production this month. The Bradys, who have developed the Mexican deposits almost singlehandedly, have never been interested in the mundane details of running a business.

For a price that may eventually total between $8-15 million (depending on still-to-be-paid royalties and other intangibles), the Bradys have transferred to the New York investment house of Bear, Stearns & Co., and to E. J. Hudson, president of Houston's Hudson Engineering Corp., their 57% interest in Gulf and their 15% interest in Mexican Gulf Sulphur —another company that they had sparked.

The real prize to the new owners, however, may be another arrangement with the Bradys—one that will allow Gulf to develop a further 5,000-acre concession still held by the Bradys through their Pan American Exploration Corp.

The similarity of this corporation's name to that of Pan American Sulphur (*see map*) points up the substantial amount of intermarriage that has occurred in the Mexican sulfur industry. Here, then, is a rundown of who's who in sulfur south of the border:

• **Pan American Sulphur,** so far, is the most successful of the companies. It is producing some 2,000 tons of sulfur per day, and is now working on a $1.5-million expansion that will up its capacity to 3,000 tons.

• **Mexican Gulf Sulphur** is the only other company that has already produced sulfur, but it has not done well, either with its finances or its production. It is producing somewhere around 150 tons/day—a figure well below its capacity. Some observers blame its poor showing on inadequate technical supervision. Paul Nachtman, Mexsul president, is now in Mexico City discussing possible merger into Gulf Sulphur with Stuart Dorman, who, with the exit of the Bradys, was upped from executive vice-president to president of Gulf.

• **Gulf Sulphur,** itself, isn't doing badly. It is now heating its dome in preparation for first production later this month. While its own shipping facilities won't be ready until the end of July, Gulf is expected to stock production at its dock storage bins before that time.

• **Texas Gulf Sulphur,** biggest U.S. producer, is expected to begin operation at its dome just south of Gulf's sometime before the end of this summer. It has one novelty in its operation that other firms do not—it floated a plant capable of producing 1 million gal./day of superheated water up the Coachapa River, and thus could easily move on to another location once its present deposit is exhausted.

• **Texas International Sulphur,** of all the companies involved, has the most unusual concession grant from the Mexican government. The company, headed by A. M. (Mike) Macris, a Mexican national, currently owns a 126,000-acre concession. Each year, it must turn back some 17,000 acres to the government. So far, it has proved out some 5 million tons of reserves.

• **Isthmian Sulphur** is by all odds, the least-known company. It is an affiliate of Azufres de Mexico (*CW, Aug. 27, '55, p. 16*), a concern headed by Mexican nationals. The company plans to solicit both capital and technical assistance in the U.S.

The Question: The importance of the Mexican industry to the American chemical producer depends on whether such material (once the Mexican government's 10% royalty and 8% export tax have been paid) could be competitive in the United States. The answer: within the next few years it might be, but it isn't too likely. Instead, Mexican producers are competing for world markets, where they are generally up against U.S. Frasch-process exports, and European pyrites and anhydrite. First indication of competition in such markets came in March, when Freeport Sulphur dropped its export prices to $27-28/ton (*CW Market Newsletter, March 10*). Just in the past fortnight, other U. S. producers have followed suit.

On a longer-term basis, Mexico may establish a beachhead. This would depend on whether there are continued new discoveries of sulfur deposits in the U.S., and on the still unevaluated offshore deposits, like those currently being explored by Humble Oil.

New Trail for the 20-Mule Team

Pacific Coast Borax's 20-mule team rounded another historic corner last week when its British owners okayed a proposal to set the company up as a separate U.S. enterprise, as it was when "Borax" Smith incorporated it back in wilder days.

Transfer of the parent firm's (Borax Consolidated, Ltd.) U.S. assets does not mean complete end, after 60 years, of British control, though a majority of PCB's new board will be Americans and 8½% of its stock U.S.-owned. (A higher percentage of American ownership is ahead as the imminent merger with U.S. Potash goes through, *CW Business Newsletter, May 5.*) But while control remains with the British holding company, PCB will actually own its properties, plants, sales and distribution facilities.

GERSTLEY: 'Though we're diversifying, our future is staked on boron.'

On Top of the World: That's no small chunk. PCB is now the world's largest supplier of boron and its increasingly important strategic derivatives. Today, the firm mines about 70% of the U.S. output (some 250,000 tons, on a B_2O_3 basis, in '55). American Potash accounts for some 22%, and West End Chemical about 8% of the U.S. supply. Together, the three producers meet approximately 95% of the world's present demand of boron chemicals from a tiny corner of California, southwest of Death Valley.

But only PCB ships significant quantities of both refined borates (from its Wilmington, Calif., refinery) and ore concentrates (from its mill at Boron, Calif.). Ampot and West End obtain their borax from brine, and consequently have virtually no ore concentrates available.

For PCB, the recent surge of boron into strategic defense uses (in jet and rocket fuels, in atomic energy) takes on special significance.

Boron's new role, in fact, triggered Borax Consolidated's decision to set up Pacific Coast as an American entity. As a division of a British firm, it could not obtain U.S. research contracts and access to classified information.

More Research: Besides looking for some government contracts, the company plans substantially increased boron research expenditures of its own.

In 1955, PCB's research budget totaled $300,000. This year, it will increase slightly to $350,000. But by 1958, PCB currently estimates, its yearly research budget should approach $750,000. It's just acquired a 5-acre tract near Anaheim, Calif., where it will construct a new research center.

But there are some company officials who feel that, even if you add in U.S. Potash's research spending, the total will still be too small. They will push for further increases and, perhaps, for acquisition of some small research and development firm, primarily for its personnel and facilities.

Taxes, Too: Besides enhancing its research position, PCB will gain by the move in other ways. The firm will avoid United Kingdom tax liabilities, which presently nullify any advantages realized from U.S. ore depletion allowances.

Too, PCB will have easier access to any financing needed to broaden its base, merge, or acquire other interests. It's cheaper for an American firm to borrow in the U.S.

Arrangements are already well along with U.S. banks and insurance companies to raise $16 million of the $18 million needed for expansion projects now under way. The company will build what it terms the world's biggest, most modern borax refinery (due in during late 1957) at its Boron mine site. It is already converting to open-pit mining techniques there, since PCB estimates it has been leaving behind 40% of the available ore using conventional techniques.

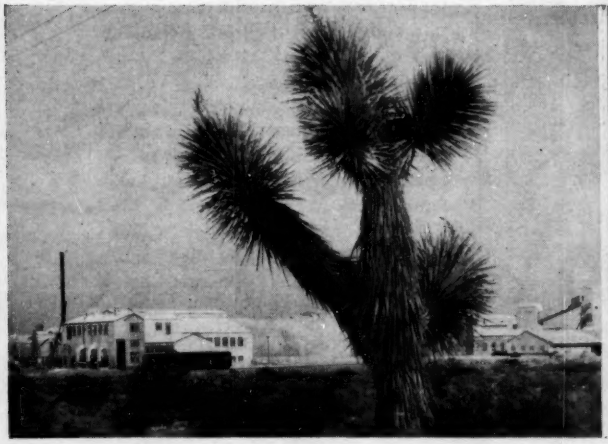
Besides this $16 million, another $7 million will be raised by selling 8½% of the outstanding stock to an investment banking group headed by Lazard Freres. Their representatives, in addition to those from the F. Eberstadt, Lee Higginson and the Rockefeller interests, will sit on PCB's board of directors.

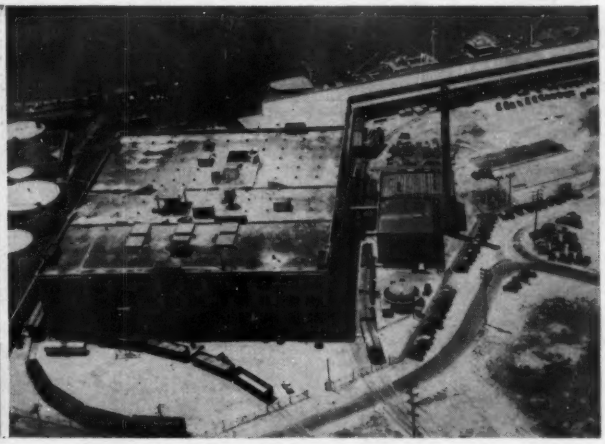
Their election will give PCB a board with a more sensitive eye on U.S. financial conditions, as well as one whose membership won't shy away from presenting their own opinions.

Additionally, F. A. Lesser, who is the British managing director of Borax Consolidated, will be board chairman, while James Gerstley, son of one of the original PCB founders, will be director and president; he was president and general manager of PCB when it operated as a division.

One of the top issues on the new board's agenda will be to consolidate with U.S. Potash. Borax Consolidated already owns about 30% of U.S. Potash stock. With U.S. Potash's sales (about $16 million in 1955, derived mostly from mining and refining potash salts in New Mexico), the addition will give PCB an immediate sales and profit boost. Gross profit for Borax Consolidated amounted to $6.8 million last year. Its net profit was $3.6 million.

Gerstley believes, with the advent of organic boron compounds, the company's dollar volume in these chemicals could some day compare favorably with dollar volume in inorganic borates, though, of course, not on a tonnage basis. His estimate for U.S. boron production (B_2O_3 basis) in '64: an increase of over 40%—to more than 350,000 tons.





AT BORON AND WILMINGTON: At PCB's mine, an $18-million expansion; for its refinery, modernization.

Start of an Industry

Atomic Energy Commission last week awarded contracts for the purchase of 2.2 million lbs. of zirconium during each of the next five years.

The program, which will cost AEC about $14 million/year, will not only establish zirconium as a material for use in atomic reactors, but also will give it a big push toward large-scale use of commercial grades.

The plants and the companies:

National Distillers Products Corp. will build a 1.5-million-lbs./year plant at Ashtabula, O. This facility, to be completed by July '57, will supply AEC with 1 million lbs./year of the metal. The plant will use a new sodium reduction process, possibly utilizing a sodium dispersion, to produce the material.

NRC Metals Corp. will erect a plant near Pensacola, Fla., from which it will supply AEC with 700,000 lbs./year of zirconium. The company will use a process developed by its parent, National Research Corp. (*see p. 84*), which uses ammonia and nitric acid in refining the zirconium ore. It will obtain these products from the adjoining plant of the Escambia Bay Chemical Corp., of which NRC is an owner.

Carborundum Metals Co., which is currently supplying 200,000 lbs./year of the metal to AEC, will build a new plant at Parkersburg, W.Va., to supply the commission with 500,000 lbs. more a year. The plant will use the traditional magnesium reduction (Kroll) technique.

To trade observers, AEC's decision to include one Kroll producer shows a reluctance to forsake the traditional process—despite prospect of lower costs. NRC Metals is being paid $6.50/lb. for its zirconium, National Distillers, "somewhat" under $5. The reputed price that Carborundum is being paid is $8/lb.

All companies will sell to outside buyers—at a higher price.

The Whys of Zirconium: Reason for the sharp step-up is the unusual set of nuclear properties of the metal. It has a low susceptibility to neutrons—and thus can be used as a structural material for the core of a reactor. Its properties are especially valuable for use in the type of reactors used in submarines—and it's the Navy's propulsion program that will up present stockpiles and production of the metal.

To take up the slack, AEC has also:

- Signed with Carborundum to boost its current annual production to 350,000 lbs./year.
- Agreed on a crop barter deal with the Commodity Credit Corp. by which it will import a total of 200,000 lbs. from Japan.
- Signed a contract under which it will buy 300,000 lbs./year from the Wah Chang Corp. (New York), which will reactivate the closed-down Bureau of Mines zirconium pilot plant at Albany, Ore. Wah Chang will start production this August; its contract extends through June 30, '58.

Unveiling a 'Bird'

FIRST public showing of the earth satellite rocket model came last Thursday in Washington, as John Hagen—who heads the project—explained the three-stage device (shown here in 1/25 scale).

The satellite (shown here as a transparent globe at end of the third rocket stage, left center) will be detached only after it has reached a 200-300 mile height, and is moving at a speed fast enough to counteract the pull of gravity. If the first "bird" lives up to expectations, it should stay in the air for about two weeks.

WIDE WORLD

COMPANIES . . . .

Kennecott Copper Corp. plans to exercise its options on some 120 acres at Tonawanda, N.Y., where it may construct a primary titanium plant.

•

New Idria Mining & Chemical Co. will, subject to the approval of stockholders, acquire Beaver Petroleum Corp. (Wilmington, Del.) and Laan-Tex Oil Corp. (Dallas, Tex.).

•

Kaiser Aluminum & Chemical Corp.'s issue of 300,000 shares of 4⅛% cumulative convertible preferred stock has been oversubscribed. Total value of the issue: $30 million.

•

Climax Molybdenum and Mallinckrodt Chemical will submit to the Atomic Energy Commission a joint proposal to construct and operate a privately owned plant for refining uranium compounds.

•

United Dye & Chemical Corp. has acquired controlling interest in the Bon Ami Co.

•

American Potash & Chemical shareholders voted to split Ampot's Class A and Class B stocks 2-for-1, and to increase the authorized number of such shares from 1 million to 3 million. Class B stock becomes common stock.

•

Filtrol Corp. (Los Angeles) stockholders have voted to increase authorized common shares from 1.5 million to 5 million.

•

Incorporated in Delaware this week: Kendrick Chemical Co., with authorized capital stock of $500,000; Lehigh Chemical & Research Corp., with capital stock of $200,000.

•

Wyandotte Chemicals' first public offering of 100,000 common shares, expected late in May, will be sold at a price just under $30/share. Total issue value: $3 million.

•

Champion Paper & Fibre directors have recommended a 2-for-1 stock split to its stockholders.

Are you looking for a way to increase cement production?
Or for a chemical that will improve your detergent?
A better way to flameproof plastics, cloth, paper, wood?
Perhaps your problem is to improve ceramics and vitreous finishes.
Whatever your plans are for product or process improvement,
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Washington Angles »

» The Atomic Energy Commission hushed up another accident. This time it involved some 150,000 lbs. of zirconium metal, which caught fire and burned about a year ago at Pittsburgh, destroying metal and the storage building. The metal, at current market price, was worth $2.1 million.

» Synthetic rubber makers had a good record from an antitrust standpoint, Attorney General Brownell told Congress last week. But he criticized the industry's "price inflexibility."

Industry's answer: a price boost by one maker, just after the report was submitted. This, antitrust aides say, "will undoubtedly be covered" in next year's report.

» Did businessmen in government cause the current shortage of newsprint? Yes, say House investigators, who have long been critical of businessmen serving in the Commerce Dept. as WOC's (without government payment of salaries). There is a chance, say the probers, of "neglect of the public interest because of a personal involvement with the rising or falling fortunes of a particular industry."

» No automatic shutdown for paintmaking plants of the Navy Dept. is in sight. The House Appropriations Committee refused to eliminate a provision in the law that requires military officials to check with Congress before closing down any commercial-type activity.

But the Navy will try again, using data collected for it by the National Paint, Varnish & Lacquer Assn.

» About $19 billion must be spent for water distribution facilities in order to meet estimated 1975 industry and home needs, say Commerce Dept. officials. They put value of present facilities at $22.8 billion; $13 billion more will be needed for new plant, $6 billion to replace obsolete equipment.

EXPANSION . . . .

Chlorine/Caustic: Olin Mathieson will spend $7.5 million to double its chlorine-caustic soda output at McIntosh, Ala. The addition will boost plant capacity to 250 tons/day of chlorine, 280 tons/day of caustic.

•

Aniline: American Cyanamid will begin immediate construction of a 24-million-lbs./year aniline plant at Willow Island, W. Va. Completion is expected by the fall of 1957.

•

Sulfur: Phillips Chemical will build a plant in Andrews County, Texas, to produce 60 long tons/day of sulfur, using acid gas feedstock.

• Gulf Oil Corp. plans to double the capacity of its sulfur recovery unit at its Port Arthur, Tex., refinery. The enlarged unit will produce 280,000 lbs./day of sulfur from refinery gases.

• Jefferson Lake Sulphur and Pacific Petroleums, Ltd., will jointly spend $1.8 million to construct units that will produce 300 long tons/day of sulfur from natural gas. Plant location: near Fort St. John, B. C.

•

Melamine: American Cyanamid will increase its melamine capacity at Wallingford, Conn., by 20 million lbs./year. In addition, the company's subsidiary, North American Cyanamid Ltd., will increase its output of dicyandiamide (used in melamine manufacture) by over 10%.

•

Hydrogen Peroxide: Du Pont of Canada will spend $18 million for a hydrogen peroxide plant at Maitland, Ont.

• Canadian Industries Ltd. plans to construct a hydrogen peroxide unit at Hamilton, Ont.

•

Chemical Cellulose: Alaska Pine & Cellulose Ltd. will boost its Port Alice, B. C., cellulose plant capacity to 125,000 tons/year.

•

Barium Oxide: Food Machinery and Chemical's Westvaco Mineral Products Division is boosting its barium oxide production 30% at Modesto, Calif.

•

Pulp and Paper: Abitibi Power & Paper is undertaking a $22-million expansion at its Fort William, Ont., plant to produce 100,000 tons/year of newsprint. In addition, the company's U. S. subsidiary, Abitibi Corp., has begun clearing a site at Alpena, Mich., for a new $16.5-million hardboard mill.

Styrene: Firestone Tire & Rubber will erect a 75,000 tons/year styrene plant near Orange, Tex., near its abuilding 40,000 tons/year butadiene unit.

FOREIGN . . . . .

Petrochemicals/Japan: Mitsui Petrochemical Industries will build a $30-million plant near Iwakuni City, Japan. Chief products will be chemical intermediates—largely for synthetic fibers. Slated for large-scale production: ethylene oxide, ethylene glycol, cumene and dimethyl terephthalate. The facilities are scheduled for completion by Nov. '57, and will be entirely financed by Japanese interests. Scientific Design (New York) will engineer several units of the over-all project.

•

Left Turn/Ceylon: Ceylon's new government will strongly encourage state ownership of basic industries—and the new policy represents a sharp reversal of trends prevalent during the final two years of the old regime. Where the old government encouraged private corporations in such industries as ceramics, DDT, caustic soda and paper, the private ownership of these projects will now be re-examined.

The new economic minister, in his first statement of public policy, also indicated that he would seek aid from Communist countries in industrializing Ceylon. He said that technical experts "should not be motivated by the imperialists' aim of impeding the industrialization of hitherto colonial countries."

for 58 Years

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FERGUSON

The Canadian Industries Limited "Terylene" polyester fiber plant near Kingston, Ont., includes a 5-story polymer building, analytical laboratory, sewage disposal plant, 5-story spinning building and boiler house in its 12 structures. Despite the enormity of the project, Ferguson designed (in collaboration with Imperial Chemical Industries of Canada Limited), built and equipped the entire facility—even completed the landscaping—in just two years.

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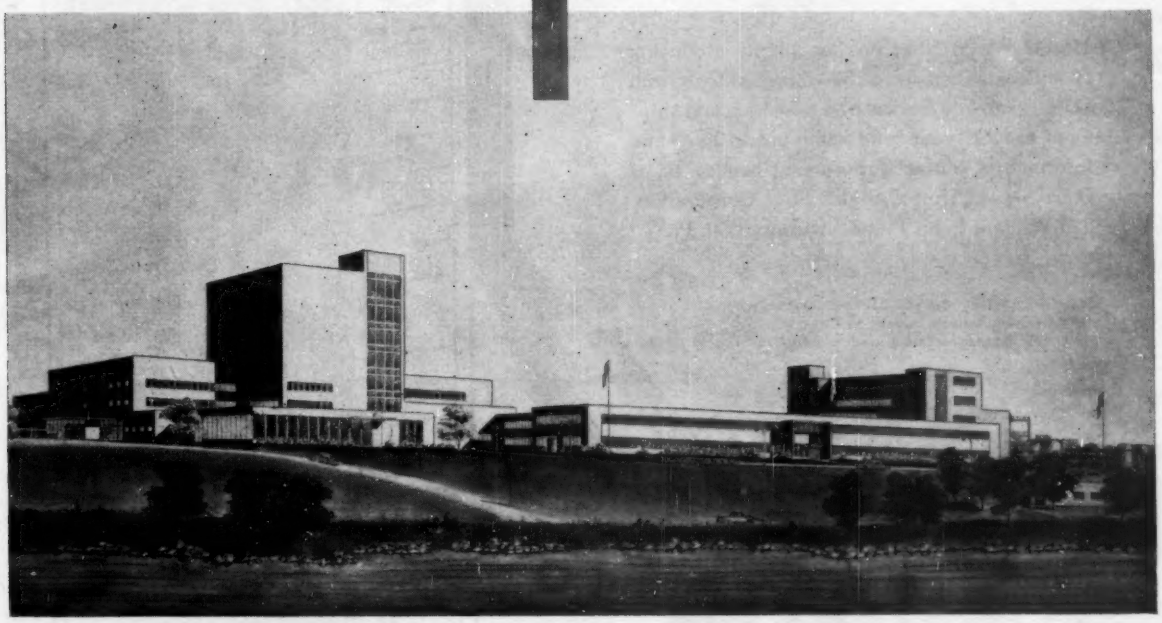

Canadian Industries Limited is designed annually to produce 11 million pounds of "Terylene"—multipurpose synthetic polyester fiber used in apparel, household and industrial fabrics.

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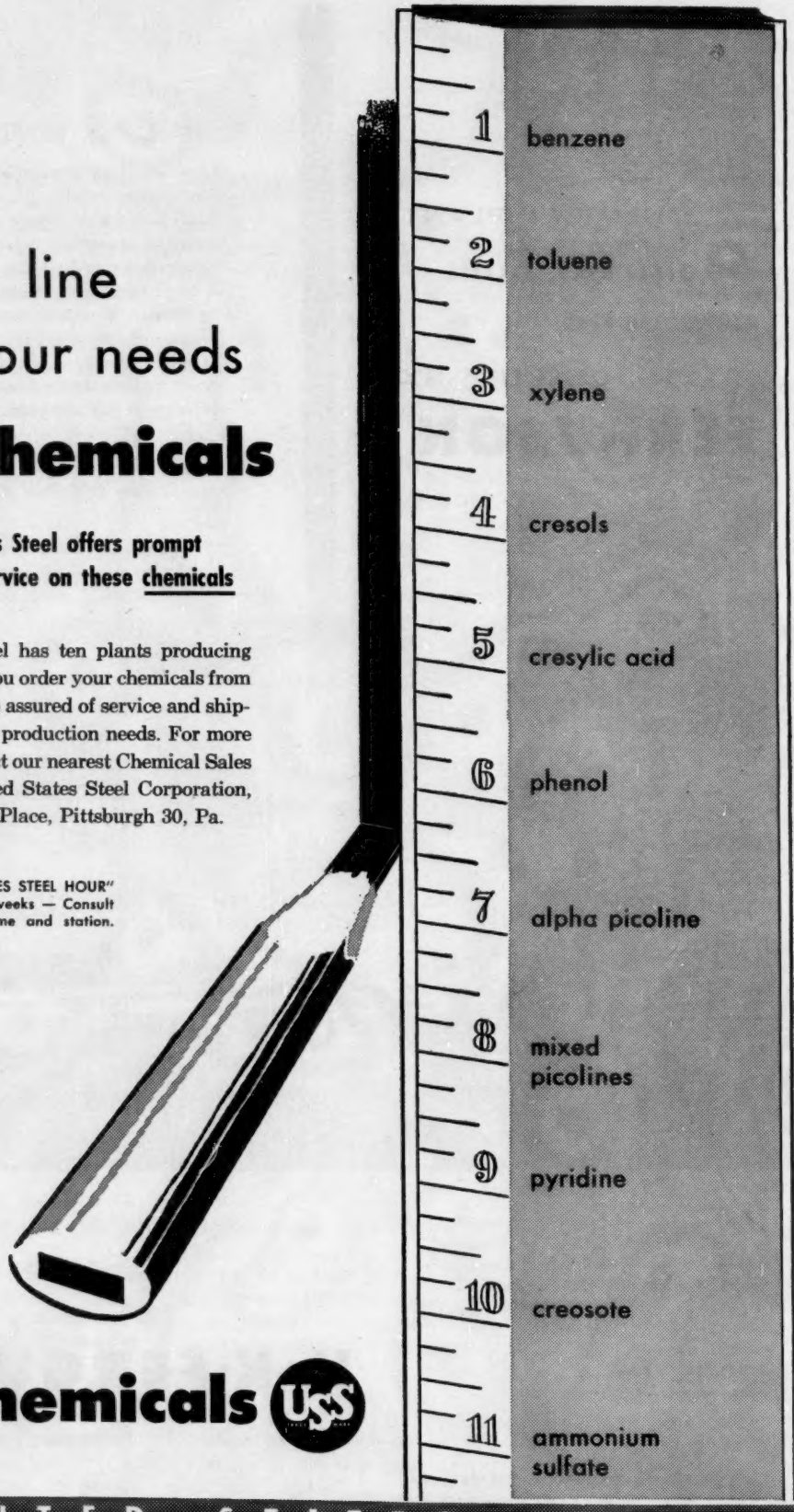


USS Chemicals

UNITED STATES STEEL

Tax Rates on Chemical Property: Going Up All Over

(Total combined state and local property tax rates in 16 industrial communities — per $1,000 assessed valuation)

City	1945	1950	1955	Increase or Decrease, '45—'55
Baltimore	$30.10	$30.039	$31.60	5.0%
Baton Rouge, La.*	23.57	27.95	32.35	37.2%
Cleveland	29.80	35.40	31.10	4.3%
Detroit	34.132	39.164	43.471	27.1%
Hopewell, Va.**	20.00	21.50	21.50	7.5%
Houston, Tex.	47.65	52.55	53.20	11.6%
Los Angeles (typical industrial section)	55.634	66.697	70.675	27.0%
Louisville, Ky.	35.50	35.50	40.50	14.1%
New York City (typical industrial section)	28.20	30.20	39.50	40.1%
Niagara Falls, N. Y.	37.33	48.80	54.92	47.0%
Philadelphia	28.75	29.70	30.25	5.3%
Pittsburgh (typical industrial section)	26.125	29.475	27.185	4.0%
Portland, Ore.	46.10	51.50	60.50	31.0%
San Jose, Calif.	45.563	60.98	69.61	52.8%
Seattle	54.70	49.40	52.50	—4.1%
Wilmington, Del.	20.00	27.60	28.70	43.5%

*Ten-year tax exemption for most new industries in Louisiana, and Baton Rouge city taxes are not levied against property lying in a special industrial district.

**Real estate tax rates only; tax rates on machinery were $25 in 1945, $28 in '50, $28 in '55.

Looming Larger in Expansion: Local Taxes

New schools, bigger city and county payrolls, more local government services for growing communities — they all add up to substantially higher real estate and machinery taxes on chemical plants.

With new and higher levies being set this month, chemical companies—with an extra-heavy investment in plants and equipment—are facing the problem of giving added weight to latest tax policies and assessment practices in carrying out current expansion programs.

NEXT WEEK at Louisville, Ky., the Jefferson County board of supervisors will hold a session pointing up a bread-and-butter problem of increasing concern to chemical management: rising property tax rates throughout the country.

As an industry that has an exceptionally high capital investment in plant and equipment, the makers of chemicals and allied products have a major stake in the higher property tax levies being set this month in Louisville and many other communities. The trend toward mounting taxes takes on still greater significance in view of this industry's ambitious plans for expansion this year and next.

While the federal government doesn't levy property taxes, this kind of tax is a major source of income for all other governmental units: states, counties, townships, cities, school districts, navigation and flood control districts, sewage and pollution control districts, etc. And with those units' budgets growing bigger each year, there's unremitting pressure on state and local officials to push property tax rates "just a little higher." Though last year's average increase was only about 5.6%, the increase in many cities has been much higher. In some places, tax levies appear to have more than doubled over the past 10 years (*see tables*).

Tax Suits Pending: At least one large chemical company, Wyandotte, is involved in litigation over what it regards as excessive tax rates in Michigan, and Dow in the same state is expected to file a similar suit as soon as there's a decision in the first case. In every chemical plant community, there's an annual problem of whether to accept the new levies meekly, protest to the local board of equalization, or use other methods of self-defense if assessors seem to be putting an unfair burden on the chemical works.

Need for vigilance on this score is emphasized by the variety of methods for figuring appraisals and the extent to which the assessor has to rely on his own judgment. It's a particularly touchy situation when there's a revaluation program or when there's a new assessor who may not be familiar with chemical equipment.

Philadelphia's Bureau of Revision of Taxes says it has no cut-and-dried assessment method; the assessor's own experience and know-how is usually the last word on any appraisal. In that city, assessed value of one large plant where a major expansion project had been carried out was increased 71% over the past decade, while valuation climbed by 40% on a small plant that hadn't been built up during that period. In New York, the land occupied by a medium-size plant in heavily industrialized Long Island City was valued at $18,000 in 1945, is now rated at $48,000, a gain of 167%. The company is accepting that new appraisal, even though the average increase on the city's realty values during that time was only 45.3%.

No Generalizations: Except for the fact that they're rising almost everywhere, you can't generalize about property taxes. In the Chicago area, suburban tax rates are about as high as those in the city; but in Los Angeles County, there are several thousand areas, each with its own tax rate, ranging from $44 to $107 per $1,000 assessed valuation.

In Baltimore, all manufacturing equipment is exempt from property taxes; but in Hopewell, Va., machinery is taxed at a steeper rate than real estate. In Detroit, there are two tax rates for machinery: one for portable, another for fixed.

Portland, Ore., assesses plants at 60% of appraised value, which is supposed to represent true cash value based on a property's earning capacity, regardless of cost of construction or replacement. At Houston, however, valuations are computed at 40% of actual or estimated 1942 construction costs; for a plant today, an assessor would probably deduct about 50% of actual cost to get the 1942 equivalent, then multiply by 40% for the assessed value.

If you have a plant in Maryland, you'll be paying 29% more on state property tax there. Philadelphia wants to raise $30 million, partly through realty levies; and Kentucky's legislators want to raise $15-22 million. It's getting so that a chemical company needs a Wall Street prospectus on a state and community's financial outlook to decide on a new plant location.

ASSESSORS' YARDSTICKS: NO TWO ALIKE

(How local tax officials would have assessed a hypothetical chemical plant whose actual value rose from $1 million in 1945 to $1.25 million 10 years later)

City	1945 Assessment	1955 Assessment	Increase or Decrease
Hopewell, Va.	$787,750	$509,000	—35.5%
Houston, Tex.	400,000	400,000	None
Louisville, Ky.	550,000	340,000	—38.2%
Portland, Ore.	600,000	750,000	25.0%
San Francisco	375,000	400,000	6.6%
Seattle	383,000	283,000	—26.1%
Wilmington, Del.	166,666	350,000	110.0%
Cleveland	625,000	512,500	—18.0%

Suit on Know-How

Add to Virginia-Carolina's proxy headaches *(CW, May 5, p. 18)* a new problem from another sector in the form of a $2.4-million lawsuit brought by a South American chemical firm. Filed in New York federal court last week, the complaint asserts that Schilling-Hillier, S. A. Industria e Commercial, and V-C entered into a licensing agreement for the former to "manufacture, process and finish in Brazil" a fungicide under the tradename Black Leaf.

Schilling charges that V-C hasn't given it the advice and information, nor manufacturing instructions, it needs to formulate and manufacture the product, and that V-C has "failed and neglected to permit [Schilling] to proceed" with its manufacture and distribution.

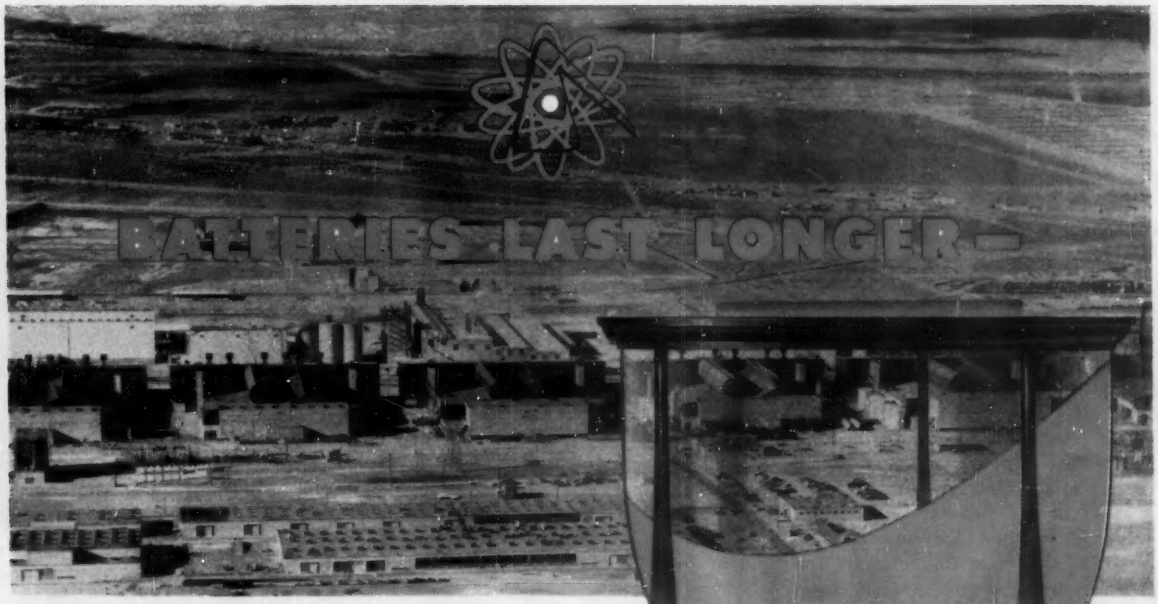
According to Schilling, the licensing agreement was made in Feb. '54, before V-C turned over its insecticide business to Diamond Black Leaf Co. (which it owns jointly with Diamond Alkali). Now, with insecticides out of V-C's direct control, observers see complicated and possibly lengthy litigation ahead for Virginia-Carolina.

Self-Help in Plastics

"Operation ethics" in the plastics housewares industry took a step forward this week as hearings were held before the Federal Trade Commission to set up "fair play" rules for the housewares business generally and the melamine dinnerware business specifically.

A voluntary effort of companies themselves, the operation is aimed at "fly-by-nights" trying to cash in on the industry's expanding sales volume. This week's hearings are the result of preliminary meetings held last December between industry spokesmen and FTC *(CW, Dec. 3, '55, p. 19)*.

Both written and oral views and information on such "unfair" practices as misleading advertising, tradename and design piracy, below-standard quality, cut-rate pricing and the like were submitted to the commission. Though FTC has taken no formal stand on the rules, other than instituting hearings, most observers expect them to go through without too much difficulty.



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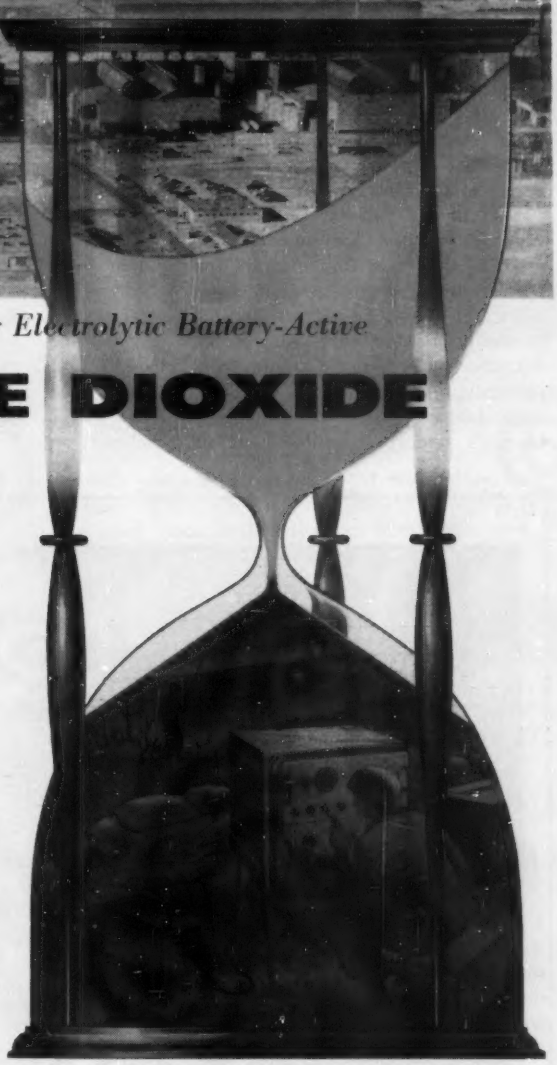

* *Trade Mark AP & CC*

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Gem Case Settled

The jurisdictional snarls of civil legislation and Tariff Commission action in the "star gems" dispute between Union Carbide's Linde Air Products Division and importer William Von Clemm have been untangled after more than two years of controversy. Settlement came with a consent decree and judgment in U.S. District Court, New York, representing a victory for Carbide: the Linde patent on a process for making synthetic star sapphires and rubies is recognized as valid, and Von Clemm agrees to drop his civil action.

Nub of the two-way dispute was Carbide's request for an exclusion order by the Tariff Commission. Von Clemm sued for a declaratory judgment that the patent was invalid due to insufficient disclosures, and for an injunction to prevent Carbide from proceeding against him. The Tariff Commission thereafter found that Von Clemm's imports constituted unfair competition because the gems were manufactured by Carbide's process and without its permission.

At issue in the Tariff office was whether the commission could base a ruling on a patent in litigation.

Now, the contest has been settled by a consent decree and judgment:

- The district court retains jurisdiction over the matter.
- Carbide's patent is valid and owned by the company.
- Von Clemm has infringed on the patent by selling star gems in this country since the patent's inception.
- Von Clemm's complaint is dismissed with prejudice.
- The decree cannot be cited as adjudication of any contest over the patent's validity or its infringement, other than between the parties.

The Tariff Commission has since dropped the case on the basis that the Von Clemm-Carbide agreement renders "the issues of the complaint moot and no basis remains for the exclusion order."

WIDE WORLD

U.S. ATTORNEY ROGERS: Good faith would be 'meaningless.'

LEGAL . . . . . .

Good Faith Defense: Mounting opposition to the proposed elimination of the Clayton Act's "good faith" clause has brought forth arguments from both the Justice Dept. and the Federal Trade Commission. The proposal, sponsored by Rep. Wright Patman (D., Tex.), seeks to correct so-called hampering effects of the clause on enforcement of the Clayton Act, would nullify the effects of the Supreme Court decision of 1951 in the Standard Oil of Indiana case. That decision held that the lowering of a price in good faith to meet the equally low price of a competitor constitutes an absolute defense against charges of price discrimination under the act. But the Justice Dept., in a letter to the House Antitrust subcommittee, signed by Deputy Attorney William P. Rogers, says the Patman bill would "render the good faith proviso practically meaningless," would deny sellers the opportunity to make sales in good faith. FTC in its letter, argues another line, says that it has not yet found a substantial basis for concluding that the clause hampers Clayton Act enforcement.

•

Pipeline Block: Petrochemical interests in the Pacific Northwest got at least a temporary go-ahead last week from the Washington state supreme court over condemnation procedures for the Pacific Northwest pipeline (*CW, April 28, p. 28*). The court has denied a requested order that

The Ones That Get Away

HOW TO ENROLL more students in chemistry and other science courses in the problem puzzling these Nassau County, New York, high school and college chemistry teachers, attending last fortnight's conference with chemistry faculty members of Brooklyn's Polytechnic Institute. Discussing trends in science enrollment and manpower is Dean Raymond Kirk of the institute's graduate school, whose gesture seems to lament some of the gifted students who "got away." Suggestions on attracting and holding high-caliber students in science studies included two calling for industry participation: full-time or part-time summer jobs for high school science students, and more publicity about chemical careers.

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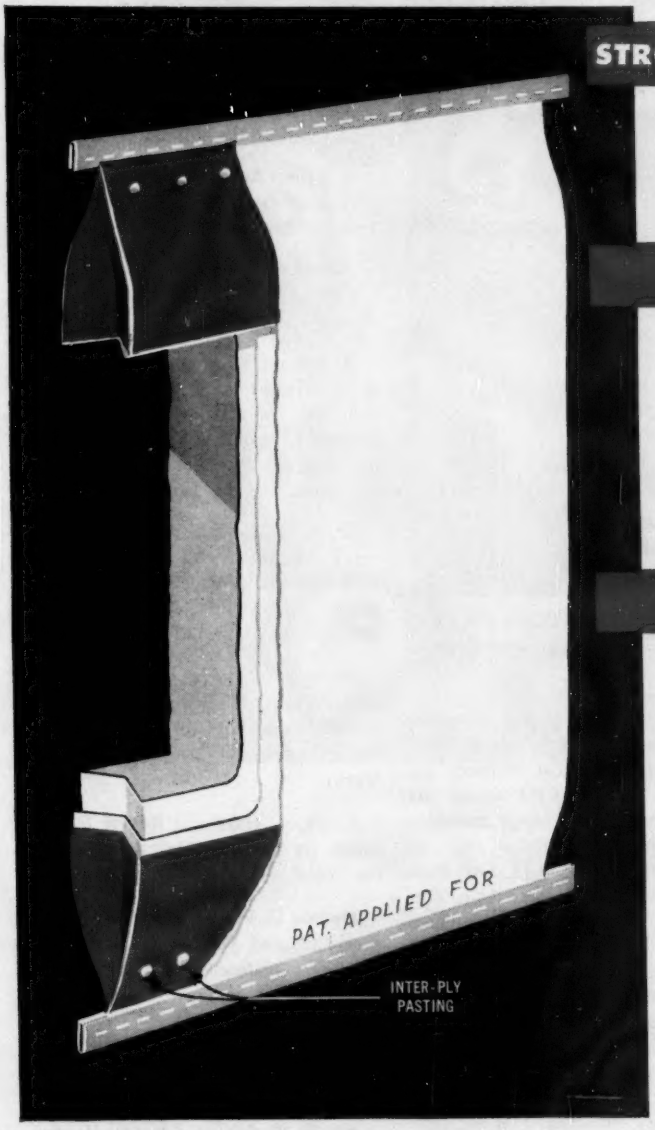

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would have blocked condemnation of land needed by the Pacific Northwest Pipeline Corp. to bring natural gas to the Seattle area. The order had been asked by Mr. and Mrs. W. C. Thomas —who own a 2½-acre tract near Issaquah—on the grounds that state laws providing for condemnation of private property for railroad and pipeline rights-of-way are unconstitutional. Whether the Thomases will try to continue the fight is uncertain, but local sources allege property-owners are being encouraged to sell their land as dearly as possible, to make the pipeline as expensive as possible.

LABOR . . . . . .

Engineers Shun AFL-CIO: The four-year-old Engineers & Scientists of America continues to move in the direction of trade unionism; but it still doesn't want formal ties with other union organizations. At the ESA convention in Dallas last fortnight, delegates first declined an invitation to merge with the American Federation of Technical Engineers (AFL-CIO), then voted down a proposal to seek AFL-CIO affiliation on their own.

Aiming to bring into its fold scientific and engineering personnel in all technology-based industries, ESA has adopted a 1956-57 budget calling for increased organizing, publicity and research activities. It's expected that the constitution will be amended at next April's convention in Los Angeles to provide for individual membership in ESA. Joseph Amann, formerly of Minneapolis, was elected to a fifth one-year term as ESA president. A major project for the coming year will be compilation of data for an "ESA National Salary Directory."

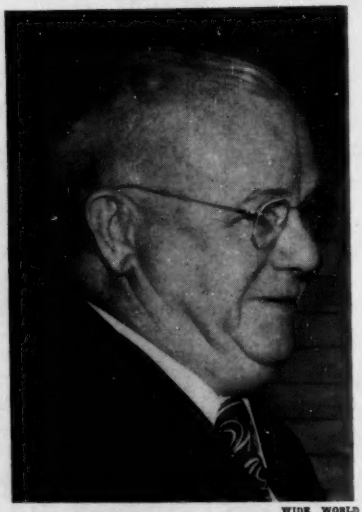
•

Internal Stresses: Strength or weakness of the AFL-CIO bond is being tested this spring in interunion disputes involving the Teamsters and the Building & Construction Trades Dept. The latter group—headed by Richard Gray—is instructing its affiliated unions to hold up merger of statewide AFL and CIO organizations pending settlement of jurisdictional arguments with the Industrial Union Dept. led by Walter Reuther.

Potential friction between the two groups is pointed up in Texas, where a strike by Building & Construction Trades Dept. unions is preventing start of construction at the $14-million butadiene plant planned by Firestone south of Orange. This keeps Industrial Union Dept. workers idle.

•

Independents Get Pay Hikes: One other Texas strike involves the Oil, Chemical & Atomic Workers (AFL-CIO) local at the Ethyl Corp. plant near Houston. The union is asking the National Labor Relations Board to censure the company for alleged refusal to bargain in good faith. The company denies this charge, asserting that it's willing to resume negotiations.



WIDE WORLD

CONSTRUCTION MEN'S GRAY: For AFL-CIO harmony, a stiff test.

Meanwhile, chemical workers not represented by AFL-CIO unions are in line for substantial wage increases at three Northern plants:

- At Deepwater, N.J., Du Pont and the Chemical Workers Assn. (independent) have agreed on increases of 8¢ or 9¢/hour (depending on classification) for employees at the Chambers Works. These workers received increases of 6-8¢ last August.
- At Niagara Falls, N.Y., a 7¢/hour pay hike is in effect for 1,000 hourly paid employees at three National Carbon plants in that vicinity. The employees are not represented by any union.
- At Bound Brook, N.J., a one-year, 15¢/hour package plan has ended a 24-hour strike by some 2,000 members of the Chemicals & Crafts Union (independent) at the plant of Union Carbide's Bakelite Co. division.

KEY CHANGES

Fred A. Manske, to president, and **Wells F. Anderson,** to senior vice-president and director, National Gypsum Co. (Buffalo, N. Y.).

A. L. Freedlander, to board chairman, and **A. K. Walton,** to president, Copolymer Rubber & Chemical Corp. (Baton Rouge).

Rune E. Swanson, to controller, International Minerals & Chemical Corp. (Chicago).

Hugo W. Krave, to director, Michigan Chemical Corp. (St. Louis, Mich.).

J. Ernest Miller, to vice-president in charge of sales, Goodrich-Gulf Chemicals, Inc. (Cleveland).

Albert F. Sherry, to vice-president, Chemical Insecticide Corp. (New York).

J. Russell Wilson, to general manager, Domestic Subsidiaries and Affiliates Division, and **Howard K. Nason,** to general manager, Research and Engineering Division, Monsanto Chemical Co. (St. Louis).

H. E. Bakken, J. P. Haight, Lawrence Litchfield, Jr., R. T. Whitzel, and **Edward B. Wilber,** to vice-presidents, Aluminum Co. of America (Pittsburgh).

Richard C. Fenton, Preston B. McGoodwin, Jr., Robert W. Middlebrook, John F. Duffy, to directors, Pfizer International Subsidiaries (New York).

Ralph A. Hart and **Robert E. Hilbrant,** to directors, Colgate-Palmolive Co. (New York).

Donald D. Pascal, to executive vice-president, and **William C. Buffing,** to treasurer, National Starch Products, Inc. (New York).

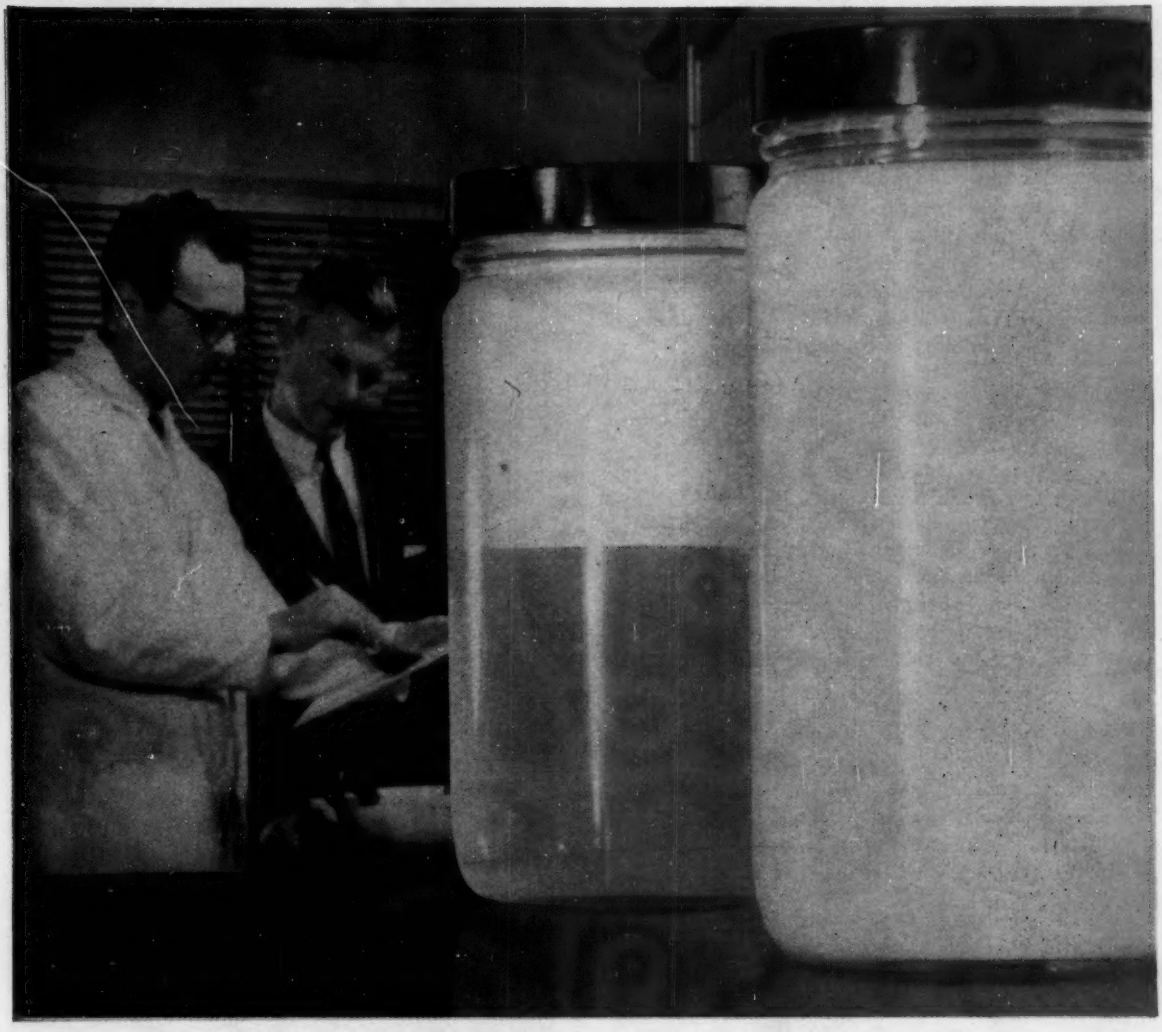
H. C. Mathey, to vice-president in charge of sales, Liquid Carbonic Corp. (Chicago).

Arthur Minich, to director, Heyden Chemical Corp. (New York).

DIED . . . . . .

Harry J. Deuel, 58, dean, University of Southern California graduate school, and noted biochemical researcher and consultant, in Pasadena.

DOW



IT'S METHOCEL FOR EMULSION STABILITY

High pH or low—Methocel is outstanding emulsion stabilizer for paints, pharmaceuticals, cosmetics

Paints or polishes. Cosmetics or pharmaceuticals. As an outstanding emulsion stabilizer, Methocel® (Dow methylcellulose) improves them all. It does this by acting as a protective colloid and depressant for the surface tension of water.

But Methocel performs many other valuable functions. In addition to stabilizing and thickening solutions, this water-soluble synthetic gum acts as a suspending agent, as a binder and forms clear, tough continuous films. Something else, too, because Methocel is synthetic, you are assured of ready availability and uniform high quality.

Send for a free sample and discover how Methocel will benefit your product. Write THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. ME 805A.

you can depend on DOW CHEMICALS

DOW

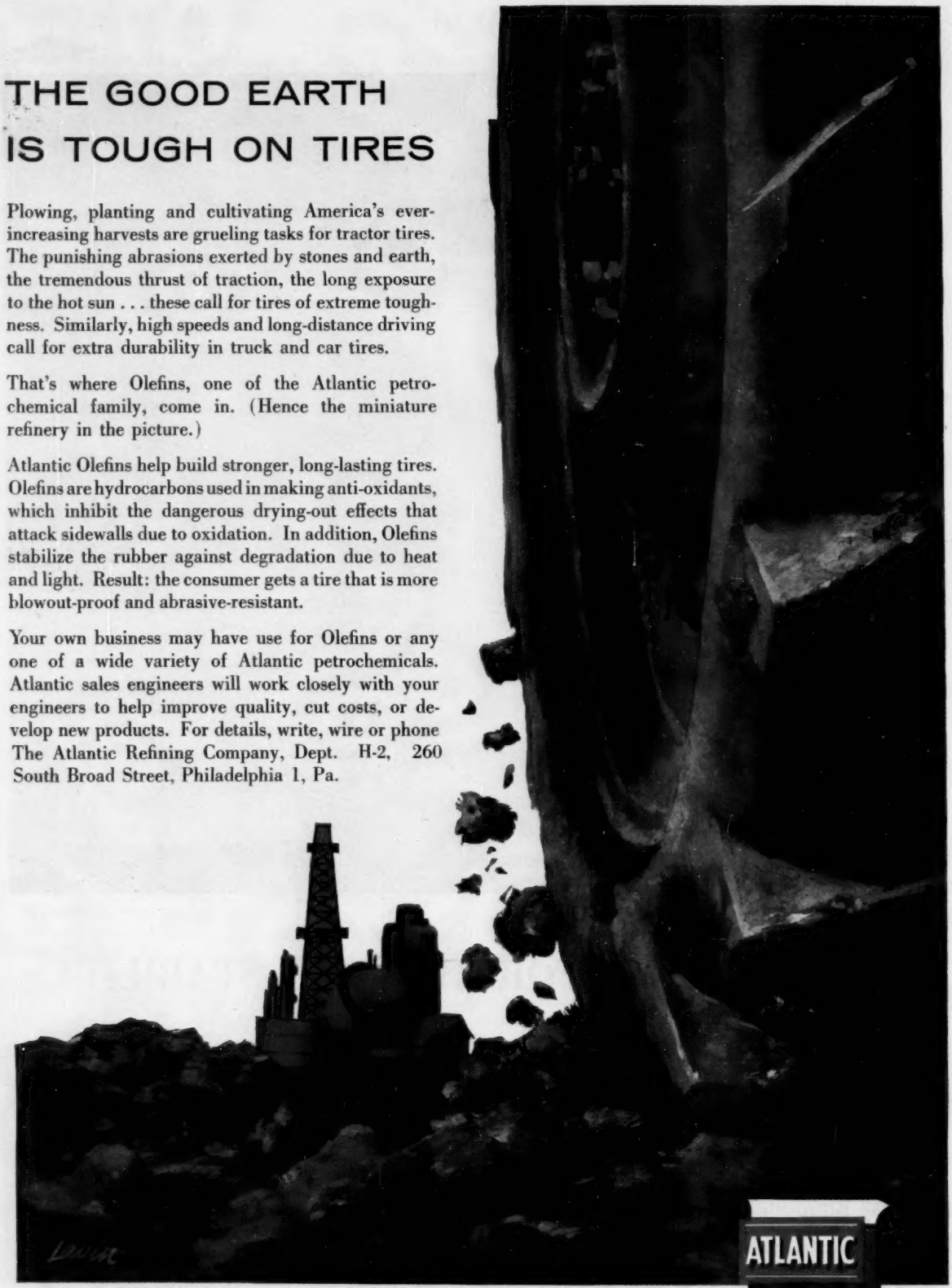
THE GOOD EARTH IS TOUGH ON TIRES

Plowing, planting and cultivating America's ever-increasing harvests are grueling tasks for tractor tires. The punishing abrasions exerted by stones and earth, the tremendous thrust of traction, the long exposure to the hot sun . . . these call for tires of extreme toughness. Similarly, high speeds and long-distance driving call for extra durability in truck and car tires.

That's where Olefins, one of the Atlantic petrochemical family, come in. (Hence the miniature refinery in the picture.)

Atlantic Olefins help build stronger, long-lasting tires. Olefins are hydrocarbons used in making anti-oxidants, which inhibit the dangerous drying-out effects that attack sidewalls due to oxidation. In addition, Olefins stabilize the rubber against degradation due to heat and light. Result: the consumer gets a tire that is more blowout-proof and abrasive-resistant.

Your own business may have use for Olefins or any one of a wide variety of Atlantic petrochemicals. Atlantic sales engineers will work closely with your engineers to help improve quality, cut costs, or develop new products. For details, write, wire or phone The Atlantic Refining Company, Dept. H-2, 260 South Broad Street, Philadelphia 1, Pa.

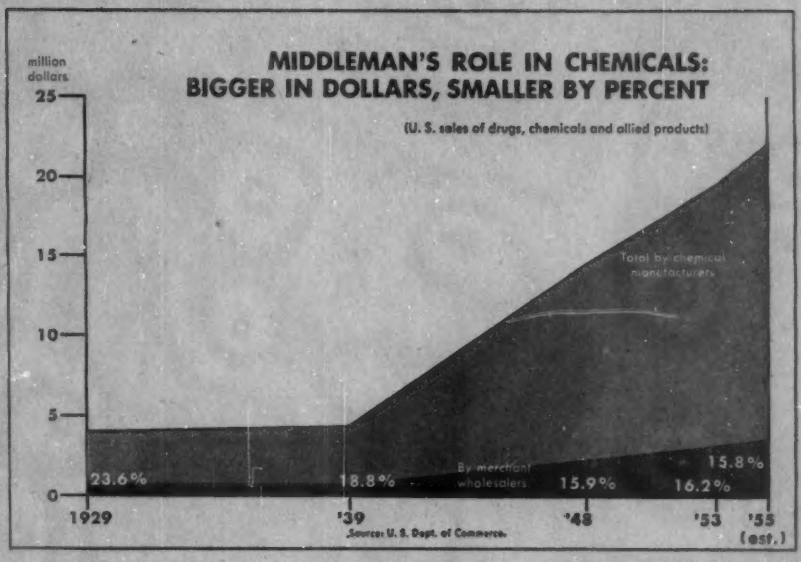


ATLANTIC PETROLEUM CHEMICALS

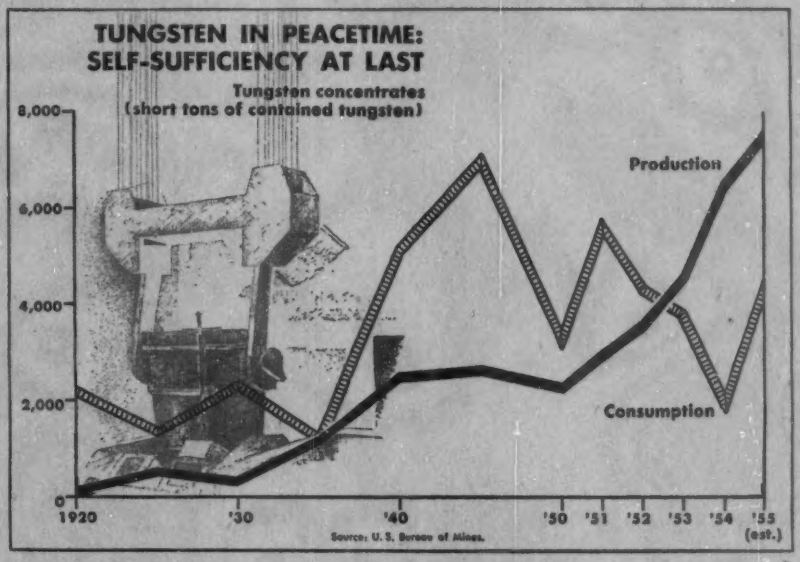
Philadelphia, Providence, Charlotte, Chicago • *In the West:* L. H. Butcher Co.
In Canada: Naugatuck Chemicals Division of Dominion Rubber Co., Ltd. • *In Europe:* Atlantic Chemicals SAB, Antwerp, Belgium • *In South America:* Atlantic Refining Company of Brazil, Rio de Janeiro

Charting Business

CHEMICAL WEEK
May 12, 1956



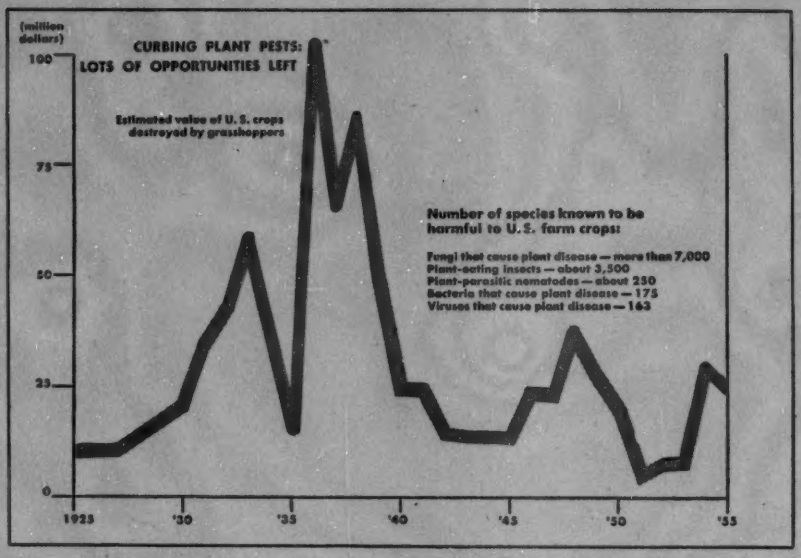
A GROWING load for chemical companies' sales staffs is reflected in latest data on U.S. wholesalers. In the boom year of 1929, makers of chemicals and allied products turned over about 24% of output to merchant wholesalers for resale to retailers and small manufacturers; but now much more of this work is being done by chemical firms' own salesmen. Although the dollar value of chemical products resold by independent wholesalers is up 272% since '29, their share of total chemical sales has dipped from 24% to 16%.



THE BIG JUMP in number of mining enterprises in the Western states—spurred by demands of government and industry for ever-larger quantities of uranium and other increasingly useful mineral products—seems to have made the U.S. self-sufficient in tungsten. Because this metal became established in industrial applications, the U.S. had to import up to 85% of annual requirements until 1952. There was a spurt in number of producers that year, and since then domestic production has exceeded use by fully 80%.

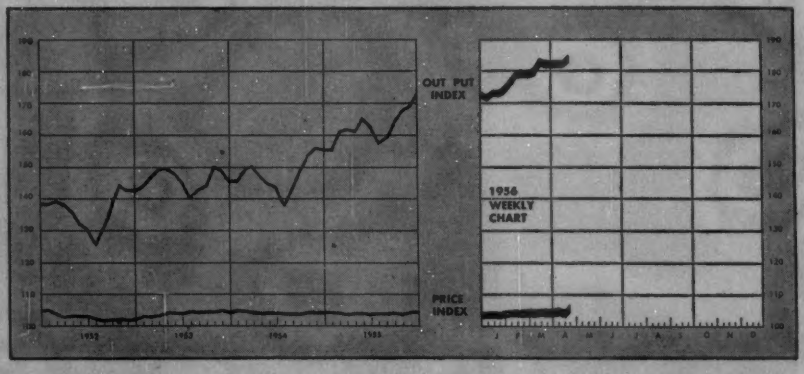
Charting Business

(Continued)



FOR MAKERS of pesticides, long-range prospects seem to be as bullish as ever. Although competition has been keen since World War II, records of the U.S. Dept. of Agriculture indicate that the industry has so far only scratched the surface of pest control. Some 11,000 tiny predator species on this continent are still getting in their licks. Grasshoppers, for example, have cut into crops by an average of nearly $20 million/year over the past decade; and their damage to range grass has been even greater, averaging about $89 million/year.

BUSINESS INDICATORS



WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week Output Index (1947-49=100)	183.1	183.3	162.7
Chemical Week Wholesale Price Index (1947=100)	106.0	105.9	104.2
Stock Price Index of 11 Chemical Companies (Standard & Poor's Corp.)	491.6	484.2	399.6

MONTHLY Employment of Production Workers (Thousands)	Latest Month	Preceding Month	Year Ago
All Manufacturing	13,199	13,229	12,778
Non-durable Goods	5,520	5,526	5,403
Chemicals and Allied Products	570	562	548

International Minerals & Chemicals

magnesium oxide pellets

high purity MgO available in carload quantities

Possibilities for the profitable use of MgO in new applications and as a replacement for less desirable materials in many industrial processes are offered you by International's production of MgO in purities over 99.0%.

International's new Magnesium Oxide Pellets are available in grades with low iron, low boron, low lime, low ignition loss. All are consistently uniform in size and quality. Also available in granular form.

EXPLORE THESE AND OTHER POSSIBILITIES

- ★ as a catalyst carrier or in other catalytic applications
- ★ for the manufacture of high purity magnesium chemicals
- ★ as an extender with other types of magnesias
- ★ as a furnace feed for electrically fused, high temperature refractories
- ★ for special glass and ceramic products
- ★ for pH adjustment in ore processing

Pellets Actual Size 1/8" diameter, 3/16" thick

FOR YOUR EXPERIMENTS

we will furnish adequate samples of International's Magnesium Oxide Pellets.

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ATLAS

CHEMICALS DIVISION
ATLAS POWDER COMPANY, WILMINGTON 99, DELAWARE • ATLAS POWDER COMPANY, CANADA, LTD., BRANTFORD, ONTARIO, CANADA

What Every Chemist Should Know about TWEEN® Emulsifiers

The TWEEN emulsifiers made by Atlas are among the best-known surfactants in the world. The reason for this popularity is that these products are used to answer the most common of all emulsion problems . . . making oil disperse in water, to form what emulsion chemists call an oil-in-water or "O/W" emulsion. The majority of cosmetic creams and lotions belong to this class of emulsions. So, too, do water-based paints, all sorts of polishes, most textile auxiliaries and agricultural chemicals.

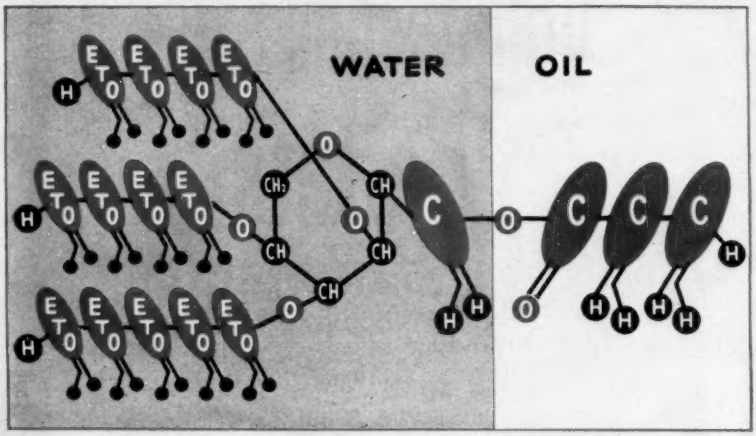
To solubilize or disperse an oil in water, a hydrophilic or water-soluble type of emulsifier is necessary. The TWEEN products are hydrophilic, because water-soluble oxyethylene groups are predominant in the typical TWEEN molecule. These products are polyoxyethylene derivatives of sorbitan (sorbitol anhydride) fatty acid esters. A certain necessary amount of attraction for oil is furnished by fatty acid hydrocarbon chains in the molecule.

The TWEEN products are non-ionic. Thus they are insensitive to hard water, and in general, non-reactive with ingredients to be emulsified. Extensive clinical and feeding tests show them to be harmless at usual levels of usage.

In the accompanying table, you will notice that the TWEEN products give the emulsion chemist a wide selection of chemical types, due to the variety of fatty acid esters from which they are derived. Also, they afford a range of emulsifying action, as indicated by their HLB (hydrophile-lipophile balance) number. This value indicates the attraction for water. The higher the number, the more hydrophilic is the product.

TWEEN PRODUCTS IN EMULSIONS

Many of the most popular types of oil-in-water emulsions can be made using TWEEN products. Among these are cosmetic creams and lotions, floor and furniture polishes, water-dispersible cutting oil concentrates, and wetting solutions. Generally the TWEEN emulsifier is used as the major component of a blend, in conjunction with a lesser amount of SPAN® lipophilic emulsifier.



Water-soluble emulsifiers are made in varying degrees of affinity for water by adding hydrophilic ethylene oxide (ETO) chains to the non-esterified hydroxyls of the sorbitan molecule. The lipophilic portion of the molecule is supplied by varying numbers and sizes of hydrocarbon groups such as those derived from fatty acids.

In water-in-oil emulsions, TWEEN materials play the part of auxiliary emulsifiers in blends that have a major percentage of one of the SPAN or ARLACEL® oil-soluble types.

SPECIAL USES

Transparent aqueous emulsions of many insoluble oils can be prepared through the use of TWEEN emulsifiers. Perfume oils, flavor oils, vitamins, pine oil and numerous others can thus be converted to convenient aqueous dispersions. Alcohol content can be considerably reduced or sometimes eliminated entirely. The "solutions" appear thoroughly clear to the eye, because the dispersed particles are of colloidal size.

Several of the TWEEN series find widespread use as anti-static lubricants for nylon and other synthetic fibers in textile processing operations. They are applied in aqueous solution at various stages in the mill.

We'll be glad to send samples of TWEEN *emulsifiers, and to offer recommendations for use in your specific formula.*

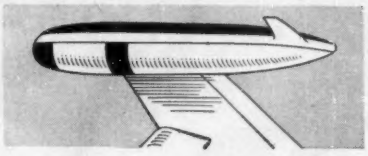
Name	Compound	HLB	Color and form, 25°C.
TWEEN 20	Polyoxyethylene sorbitan monolaurate	16.7	Lemon-orange oily liquid
TWEEN 21	Polyoxyethylene sorbitan monolaurate	13.3	Lemon-orange oily liquid
TWEEN 40	Polyoxyethylene sorbitan monopalmitate	15.6	Lemon-orange oily liquid
TWEEN 60	Polyoxyethylene sorbitan monostearate	14.9	Orange oily semi-liquid
TWEEN 61	Polyoxyethylene sorbitan monostearate	9.6	Tan waxy solid
TWEEN 65	Polyoxyethylene sorbitan tristearate	10.5	Tan waxy solid
TWEEN 80	Polyoxyethylene sorbitan monooleate	15.0	Lemon oily liquid
TWEEN 81	Polyoxyethylene sorbitan monooleate	10.0	Lemon oily liquid
TWEEN 85	Polyoxyethylene sorbitan trioleate	11.0	Lemon oily liquid

chem-memos

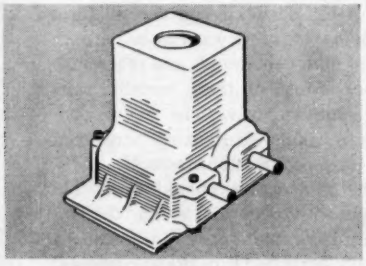
Atlac® 382 Resin upgrades polyester "pre-pregs and pre-mixes"

No doubt about it—reinforced polyester plastics are branching out. A little while ago, this type of material was used mainly in low volume, hand lay-up fabrication. Lately, industrial parts, in quantity, are being made from pre-impregnated glass cloth ("pre-preg") and pre-mixed polyester molding compounds. These forms of molding materials offer advantages of lower labor costs for handling and molding, and are cleaner to use.

Atlac 382 resin, made by Atlas, is a natural for many pre-preg and pre-mix



Aircraft Parts



Food Processing Equipment

Business Machines

formulas. People who make these formulas have been buying Atlac 382 at a sharply increasing rate. And here are some of the reasons.

Atlac resin is a dry powder, containing no monomer. It can be mixed with cross-linking monomers to get varying tack or other characteristics . . . thus giving the manufacturer a free hand in formulation. It's a different kind of polyester, based on bisphenol. It has exceptional resistance to attack by many corrosive chemicals. Many formulators use it in combination with other polyesters to "upgrade" the finished material . . . to give added chemical stability, improved electrical properties or other physical advantages.

For manufacturers of pre-preg or pre-mix materials, we have prepared Technical Bulletins giving complete facts about how to use Atlac 382 in typical formulas. Write to Atlas for a copy, and for samples of Atlac 382 for test.

"WATERLESS" HAND CLEANER FORMULATED WITH ATLAS EMULSIFIERS

An interesting type of cleaning agent lets you "wash" your hands without using water. It's a lotion-type material that you rub on your hands to loosen the soil. Wipe off with a towel, and your hands are clean and soft. The soiled towel can be cleaned just by rinsing in cold water.

The following procedure may be used as a guide in formulation. Add 42-57% of water at 62° C. to a mixture of 30-45% deodorized kerosene, 3% lanolin and 10% emulsifier at 60° C., and agitate until cool. The emulsifier portion may be a blend of 75% TWEEN® 40 and 25% ARLACEL® 40 or a blend of 85% TWEEN 60 and 15% ARLACEL 60.

"Divinity" Confection is Delectable with SORBO®

Divinity candy is a traditional Dixie specialty . . . another interesting example of the use of SORBO 70% sorbitol solution. This confection is a highly aerated combination of eggs, tapioca flour and sugar, frequently including nuts. Making it is an art, especially when wide distribution to retail stores is desired, since the candy is highly perishable, tending to harden quickly.

To help overcome this difficulty, most manufacturers of divinity now incorporate SORBO, which Atlas makes by hydrogenating sugar. SORBO has a unique facility for retarding moisture loss and also for slowing down the rate of sugar crystallization. Tests in the Atlas Candy Laboratory show that standard divinity becomes "rock-like" after 7 days, while SORBO divinity is still edible after 22 days, though increased in firmness.

For further information on use of sorbitol in confections, or its applications in other industries, write to Atlas.

EXCHANGE: New nontoxic antiseptics take skeleton out of medicine chest.

First Aid for Antiseptics

The first spring breezes invariably plunge people of all ages into paroxysms of picnicing, lawn mowing, screen hanging, bicycle riding and any number of other outdoor pursuits. Each year, the by-product of all this energetic activity is a bruising harvest of incisions, abrasions and lacerations Providing protective balm for these minor wounds is the lot of antiseptic makers, whose business in products for the home now nets about $21 million/year.

Suprisingly, this value has remained almost constant for the past three years. But this year, with new products and a shrewd new pricing idea, the antiseptic makers are out to jack up sales figures to a new high.

• Johnson & Johnson is leading the new-product parade with its bithionol-based antiseptic cream. You can expect more entries of this sort soon, including one made with West Disinfecting Co.'s (New York) Wescodyne, an iodine-surface-active-agent complex.

• Pricing structure, too, is being revamped by J&J. Whereas the average Mercurochrome or tincture of iodine sale is a ½-oz. bottle at 15-25¢, J&J will sell its first-aid cream in 1½-oz. polyethylene tubes for 98¢ (*CW, March 24, p. 70*). Dollar volume seems sure to go up.

Cheap Protection: The widespread use of high-priced antibiotics (which has chopped into antiseptic sales) is making it easier to increase antiseptic prices. J&J proved that old cost barriers were down before it introduced its cream; also indicative of the changing attitude is another firm's experience—it found no sales resistance to its 39¢ product, even after it was tagged at 59¢.

Comfortable Injury: The principal claims for the new products are safety (nonpoisonous), convenience and comfort. J&J's cream is advertised as "stingless, stainless, greaseless."

Not the first to claim painlessness, J&J is expected to make more of this feature than its predecessors. For one thing, the cream is claimed not only to be stingless on application, but also to relieve the pain of the wound. The anesthetic in the preparation is benzyl alcohol; bithionol (Monsanto's Actamer, incidentally) is the antiseptic agent. Previous no-sting claims have not been significantly successful. But, as many point out, they were not made by a firm with the stature of Johnson & Johnson, or backed with the same number of dollars.

Painlessness is a sales point of most of the other newcomers of which these two are representative: Stayner Corp.'s (Berkeley, Calif.) Merosol, a polyethylene-tubed liquid containing sodium ethylmercurothiosalicylate sold on the Pacific Coast (*CW, Sept. 10, '55, p. 64*); and the upcoming product using West Disinfecting Co.'s Wescodyne.

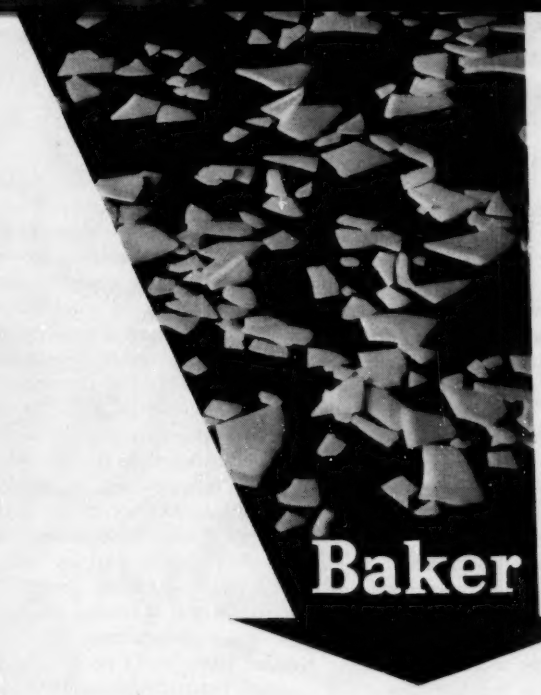
Aerosol Antiseptics: These products will scarcely have time to establish places for themselves before they, in turn, will be hit by the second wave of new products: powder and liquid aerosols. These will include old standbys as well as entirely new formulas.

G. Barr & Co. (Chicago) reports that it has developed an aerosol form of iodine, looks forward to quaternary ammonium compounds and other antiseptics. Most of these metallic salts are quite corrosive (to metal containers), and will probably be packed in 4- or 6-oz. glass bottles.

The new forms should upset old competitive patterns within the industry. Now, liquids account for about half of the sales, with creams (salves, jellies, pastes) in second place, powders in third. The two biggest sellers—tincture of iodine and Mercurochrome (patent rights to which are held by Hynsen, Westcott & Dunning, Inc.; Baltimore, Md.)—are sold by virtually every drug house that has a package line.

Mercurochrome is destined to receive a big setback when it loses the big J&J first-aid kit account. J&J is replacing Mercurochrome with its own cream in its big $6.50 kits and 69¢ pocket kits. That's only a start.

Other popular products are Abbott's Metaphen, Eli Lilli's Merthiolate, Miles Laboratory's Bactine, and such generally available substances as boric acid and alcohol. Iodine's sales have been decreasing ($4.48 million in '52, $4.07 million in '54), probably because of the sting of its alcohol solvent (which, however, adds to its germ-killing ability).



Here's news!

Baker CALCIUM NITRATE, Tech.
ZINC NITRATE, Tech.

in THIN FLAT FLAKES

- *Faster dissolving*
- *Uniform purity—lot after lot*
- *Controlled water of hydration*
- *Easier to handle*

Look over the photograph above, reproduced to actual size. Note the thin flakes with large surface area. THIN FLAKES go into solution FAST – you save time and money. They are easy to handle. These chemicals in *flake* form represent another Baker first.

Latex processors gain better control of coagulation because of the controlled high assay and known water of hydration. This uniform purity, controlled pH and freedom from extraneous matter insure better quality in your finished goods with fewer rejects.

These chemicals are produced to meet precise specifications. In the informative typical analysis shown below, note the very low ammonium nitrate content in Baker Calcium Nitrate. The exceptionally low copper and manganese contribute to longer life for your latex products, with less tendency to oxidize and become brittle or too soft.

These features of Baker Calcium Nitrate and Zinc Nitrate also are helpful to manufacturers of rustproofing specialties, textile finishes, pigments, adhesives and lithographic materials.

Because of the low melting points and deliquescent nature of these chemicals, they are packaged with polyethylene liners and are stored in an air conditioned warehouse at a temperature below 85°F.

Write for samples and prices for these new *flaked* products, Calcium and Zinc Nitrate Technical.

CALCIUM NITRATE, Technical Flake	*Typical analysis*
Assay (as $Ca(NO_3)_2$)	71.8 %
Water of Hydration	27.6 %
Insoluble and NH_4OH Ppt.	0.03 %
Ammonium Nitrate (NH_4NO_3)	0.1 %
Magnesium & Alkalies (as NO_3)	0.4 %
Iron (Fe)	0.0003%
Copper (Cu)	0.0004%
Manganese (Mn)	0.001 %
pH of 5% Solution	6.3
Thin (0.025 in.) flakes about ½ inch in size with the following typical mesh analysis:	
On U.S. No. 4	45%
Thru U.S. No. 20	8%

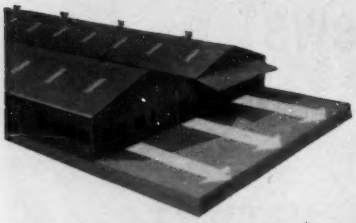
ZINC NITRATE, Technical Flake	*Typical analysis*
Assay (as $Zn(NO_3)_2$)	74.2 %
Water of Hydration	25.6 %
Insoluble Matter	0.0008%
Iron (Fe)	0.001 %
Lead (Pb)	0.005 %
pH of 5% Solution	5.1
Thin (0.035 in.) flakes about ½ inch in size with the following typical mesh analysis:	
On U.S. No. 4	26%
Thru U.S. No. 20	9%

PURITY BY THE TON
–for production use

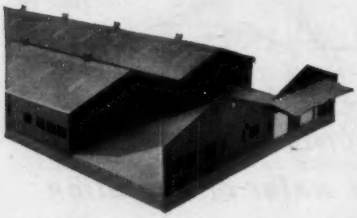
J. T. Baker Chemical Co.
REAGENT • CHEMICALS • FINE • INDUSTRIAL
Phillipsburg, New Jersey.

Don't stunt your business growth

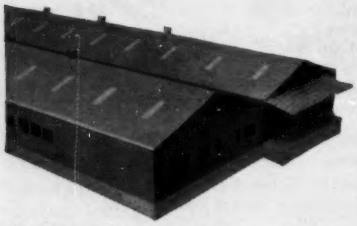
Build with Butler —the building that is easy to expand



Business expansion can be expensive—if it's not planned for. But when you choose a Butler building, you get "built-in" provision for expansion . . . fast . . . in any direction . . . usually at lower cost than initial construction.



Butler all-bolted construction cures growing pains. You unbolt the end or sidewall, move it out, intact, as far as you need, add the necessary structurals and tight-fitting cover panels, and bolt the wall back on.



Neat . . . fast . . . no strain . . . no waste. A minimum of new materials required. Need more space later? Do it again. There's no limit. It's just one of the reasons why Butler is your best building buy. Your Butler Builder can give you many others.

Consult the yellow pages of your telephone directory for name of your Butler Builder, or write on your company letterhead for informative brochure.

BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY

7459 East 13th Street, Kansas City 26, Missouri

Manufacturers of Steel Buildings • Oil Equipment
Farm Equipment • Dry Cleaners Equipment
Outdoor Advertising Equipment • Special Products

Sales Offices in Los Angeles, Richmond, Calif. Houston, Tex. • Birmingham, Ala. • Minneapolis, Minn. Chicago, Ill. • Detroit, Mich. • New York, N. Y. Burlington, Ont., Can.

More Harm than Good? Antiseptics in general have been under attack by some doctors in recent weeks. The charge: they retard healing, promote dermatitis by irritating the skin.* These doctors contend that people with minor injuries will do better to wash their wounds well with soap and water.

The new, milder antiseptics might pick up this theme for a promotion ride. Slower acting and possessing less germ-killing power than the old liquids, the new creams are also less irritating. J & J is already talking about "healing power."

It's pretty safe to assume that most people won't eschew antiseptics for soap and water. The chances are good, in fact, that they're willing to spend more for germ-killers. The popularity of antibiotics and the more expensive forms of antiseptics indicate that—in the average home—money is no object if personal safety's involved.

* The psychological value of the sting seems to be a thing of the past, but color is still important. Iodine and Mercurochrome are naturally colored, but other liquid antiseptics contain eosin dyes. When they were introduced in their natural colorless state, sales weren't good. Creams can be neutrally colored because their texture makes them stand out.

Residue Rules

The Food & Drug Administration took another look at the pesticide tolerance question last month, and updated its views in two important areas —residues of pesticide combinations and the computation of fees for the establishment of permissible residues.*

Major change in fee computation is FDA's new plan to group several agricultural products together (for charge purposes only). Residue tolerance, set on one crop, will be the basis for setting tolerances on crops in the same group. Thus, the data you provide to set a residue level on apples, for example, contributes greatly to the determination of residue levels on crab apples, pears, quinces.

Residue levels won't necessarily be the same—but establishing them on the related crops will be simpler and less expensive than on unrelated materials. FDA has created some 27 groups of crops for this purpose.

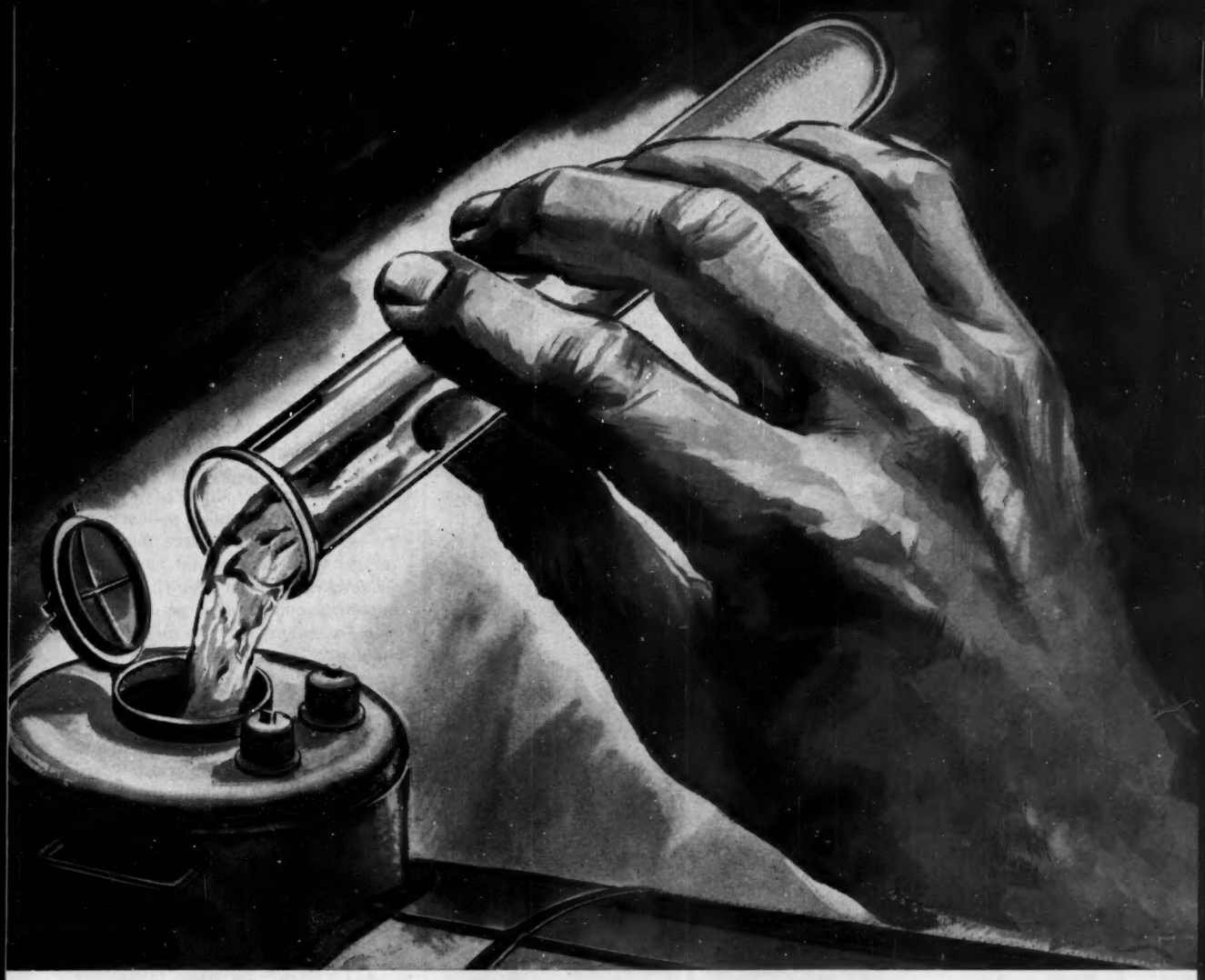
Selected for Safety: FDA has also somewhat revised its opinions on

* *Federal Register*, April 14, p. 2445.

Invisible Specialty

THERE'S a hard-to-see protective coating on the small plane above—it's a tough film of silicone paint, and on the craft shown, it has been weathering for more than a year. The plane has been washed just once, never polished. Robeson-Preserve Co. (Port Huron, Mich.) is starting to market the new coating, based on a Dow Corning silicone, at $20-26/gal., depending on color.

The coat is spray-applied—one gallon will cover a small plane such as the Cessna 140 shown—and it dries in about eight hours. Because it doesn't flake or chalk, the coat reduces maintenance expense: washing a small plane costs about $10, and waxing costs as much as $120; the paint eliminates much of this.



CELANESE* VINYL PROPIONATE MONOMER

goes "tankcar!"

Full scale production of new monomer provides new source for homopolymers and copolymers with distinctive product-improving properties

Celanese Vinyl Propionate Monomer in volume clears the way for the commercial development of new emulsion paints, adhesives, laminates, plastics, synthetic rubbers, protective coatings and finishes.

Like Vinyl Acetate—first of the Celanese Vinyl Monomers—Vinyl Propionate copolymerizes with acrylics, maleics, styrene, butadiene, and most other vinyl monomers. It promises new product values for many fields.

You can get prompt delivery of Celanese Vinyl Propionate in drum lots to tankcar quantities. For samples and technical bulletin, write:

Celanese Corporation of America, Chemical Division, Dept. 552-E, 180 Madison Avenue, New York 16.

DESCRIPTIVE DATA

Distillation Range @ 760 mm, °C	Within 6° spread Including 94.9
Color APHA, max.	30
Aldehydes as acetaldehyde, % wt., max.	0.05
Water, % wt., max.	0.25
Specific Gravity @ 20°/20°C	0.9160-0.9185

Celanese* CHEMICALS

*Reg. U. S. Pat. Off.

TENNESSEE CORPORATION

INDUSTRIAL CHEMICALS

We mine and are basic producers of Copper, Iron, Zinc and Sulfur. Our technical knowledge in these basic materials and their chemical derivatives is your assurance of exacting quality control and strict uniform consistency.

COPPER SULFATE
Industrial Crystals and all common grades.

MONOHYDRATED COPPER SULFATE
35% Copper as metallic packaged in steel drums at no extra cost.

COPPER CARBONATE
55% Copper as metallic. Light and dense grades.

CUPRIC CHLORIDE
37% Copper as metallic. Available in poly-lined drums or bags.

CUPRIC OXIDE
Minimum 76½% Copper as metallic. Technical grade ...NOT A BY-PRODUCT.

MANGANESE SULFATE
65% Mn SO_4. Designed specifically for inclusion in mixed fertilizer.

MONOHYDRATED MANGANESE SULFATE
93% Mn SO_4, H_2O. Highest purity, technical grade ...NOT A BY-PRODUCT.

MANGANOUS OXIDE
Minimum 48% Manganese as metallic. Feeds, fertilizers, spray or dust grades.

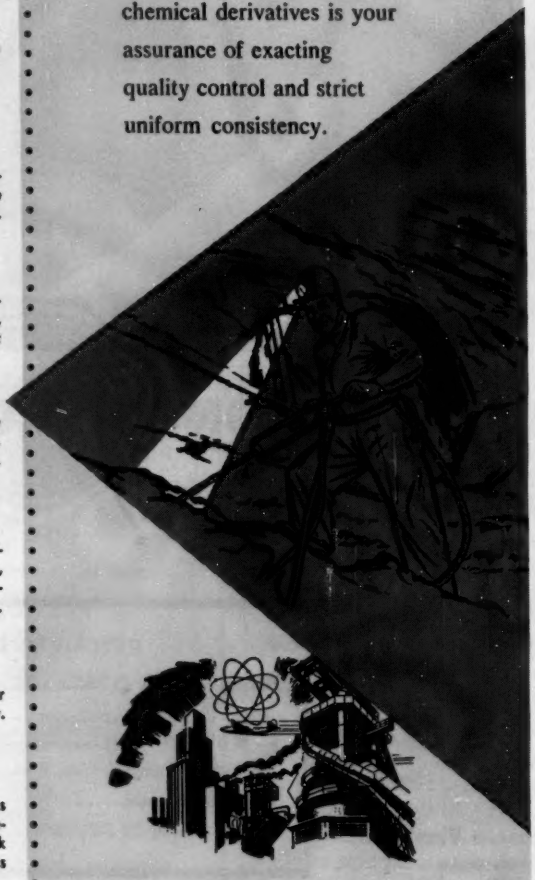
FERRIC SULFATE
Partially hydrated, free flowing granular form. Available in bags or bulk.

LIQUID SULFUR DIOXIDE
Highest commercial quality, available in tank cars, tank wagons, ton cylinders and 150-lb. cylinders.

MONOHYDRATED ZINC SULFATE
36% Zinc as metallic. For agriculture and industry.

CHLOROSULFONIC ACID
Iron less than 1.0 ppm as loaded. Water white. Delivered in glass-lined tank wagons, also in stainless steel drums.

PARA TOLUENE SULFONIC ACID, ANHYDROUS
Other organic Sulfonic Acids.



Samples, Specifications and Detailed Information Upon Request—

TENNESSEE CORPORATION

617-29 Grant Building, Atlanta, Georgia

which pesticide materials are safe to use. Originally, in Section 408 (a) of the law, safe pesticides were defined, but none were specifically named. Now, the section has been amended to include sulfur, lime-sulfur, sodium carbonate, and sodium polysulfide.

Where several pesticides (of the same class) are found on a commodity, FDA has clarified its stand on the amount of residue permitted. First, it classifies chemicals into four groups (e.g., group one is termed "chlorinated hydrocarbon pesticides"). Then, FDA approaches the combination-residue problem in three ways:

- Where two or more pesticides of the same group are present, the total-residue level must be no more than the level of the most toxic (has lowest numerical ppm. residue permitted).
- Exceptions may be made if the amount of each of the two or more pesticides (of the same class) can be determined accurately. In this case, the percentage of each pesticide is found (percentage of the permitted residue), and these percentages are added together. This sum must be less than 100%. (Suppose you have apples with 5 ppm. DDT and 10 ppm. BHC on them. And assume FDA permits 10 ppm. DDT and 30 ppm. BHC on apples. Your DDT percentage is 50%, the BHC percentage is 33.3%. The total is 83.3%, and all is well.)
- There is a bit more calculation where several pesticides are present and identifiable, but where only a few of them can be quantitatively determined. The total amount of residue is first found. From this are subtracted the determinable and identifiable residues. For these "knowns," the percentage of permissible residue is found (as in the case above). The "unknowns" are lumped together (the amount of residue for them is the total minus the amount of the "knowns"), and a residue tolerance is assigned to them—this level is the lowest numerical value of any of the tolerances for the pesticides in the "unknown" group. For these "unknowns," percentage of the permitted tolerances is calculated. The percentages must total less than 100%.

Although the procedure suggests the grammar-school riddle of how to add apples and bananas and watermelons, it should serve the basic purpose of the Miller amendment—to keep pesticide residues at a safe level.

Whether your problem is removing dirt, dust, soot or fly ash, cleaning gas for re-use or air for recirculation, reclaiming valuable materials—Koppers Engineers can make unbiased recommendations for you. Why? Because Koppers makes all three basic types of industrial gas cleaning equipment.

KOPPERS

Makes Everything You Need to Solve Industrial Gas Cleaning Problems!

There's a Koppers unit to solve *your* air pollution problem. It doesn't make any difference how small or how big your plant is. The type of industry in which you're engaged poses no difficulty. The amount of your industrially entrained material, and its particle size, present no obstacles.

Why? Because there are three basic types of industrial gas cleaning equipment which . . . among them . . . solve industrial air pollution problems. And Koppers makes the *three* basic types! But Koppers goes way beyond merely providing equipment. Koppers engineers study and analyze your individual air pollution problem. They consider the gas and dust volume, particle size and type of your industrially entrained material.

Then, because Koppers makes a complete line of equipment, our engineers can recommend *whatever* equipment best suits your needs. Koppers engineers wear no "blinders" . . . are not limited in their recommendations. Our complete engineering service, combined with a complete line of equipment, is your best assurance of a practical, efficient solution to your air pollution problem . . . whatever it is.

For more information, write to KOPPERS COMPANY, INC., Industrial Gas Cleaning Dept., 4705 Scott Street, Baltimore 3, Maryland.

Whatever you need, Koppers makes it!

Koppers Electrostatic Precipitator. Custom-designed to eliminate "stack nuisance" . . . remove fly ash, acid mist, soot . . . recover high value materials . . . clean and purify for re-use.

Koppers New Cyclonic Type Dust Collector. Produced after years of intensive study and experience, Koppers Mechanical Dust Collector provides maximum efficiency in mechanical dust removal.

Koppers Aeroturn Dust Collectors. Automatic pressure control and reverse-air-jet action provide high, continuous filtering. Koppers Aeroturn cleans air . . . reclaims valuable materials. Felt-type filters are more efficient and longer-lasting than other filters.

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Koppers Company, Inc., Metal Products Division
Industrial Gas Cleaning Department

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As wet as rain water? As wet as well-water or tap water? You're wrong if you think so! Wet is as wet as Jacques Wolf Wetting Agents make it... and that's about 1,000 times wetter than ordinary water! This vast degree of wetness is invaluable in industries as widely divergent as tanning, steel, insecticides, pigment, and paper manufacturing.

JACQUES WOLF WETTING AGENTS have thousands of uses in manufacturing processes that require reduction of surface tension, allowing exceptional penetration, saturation, wetting-out and dispersion.

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Plants in: Clifton, N.J., Carlstadt, N.J., Los Angeles, Calif.

U.S. ATOMIC ENERGY COMMISSION

ATOMIC WORKER: For his safety, $1 million/year in dosimeters.

Singled Out for Safety

Call him John Jones, or Mr. Average, but the workman shown entering the Los Alamos installation above has a very distinctive quality—his familiarity with radiation hazards; the awareness that he's receiving the best protection available. An important part of this protection is his radiation badge—his dosimeter—which today is the symbol of a vigorous specialty business.

Worn constantly by nearly everyone dealing with radioactivity, film badges and their service alone means an estimated $15,000/week to the firms that specialize in providing the badges and checking them.

But on a dollar basis, the film badges are now being seriously challenged for the first time. High-level reading gauges for radiation (for use by the office of Civilian Defense and the Army's Signal Corps) are being purchased in quantity. Bendix Aviation Corp. (Cincinnati) has just delivered one order for 20,000 pocket-type dosimeters, and last week began work on another order for 85,000 (that will sell for $500,000). Current production items sell for $5.51 each.

Chances are, our average worker wouldn't be too pleased at the prospects of wearing OCD's dosimeters —his film badge registers the virtually harmless doses of radiation he receives at work (0.3 roentgens/week, maximum); OCD's units are "disaster" indicators, showing the doses of 30 or more roentgens a citizen might get from an atomic bomb blast.

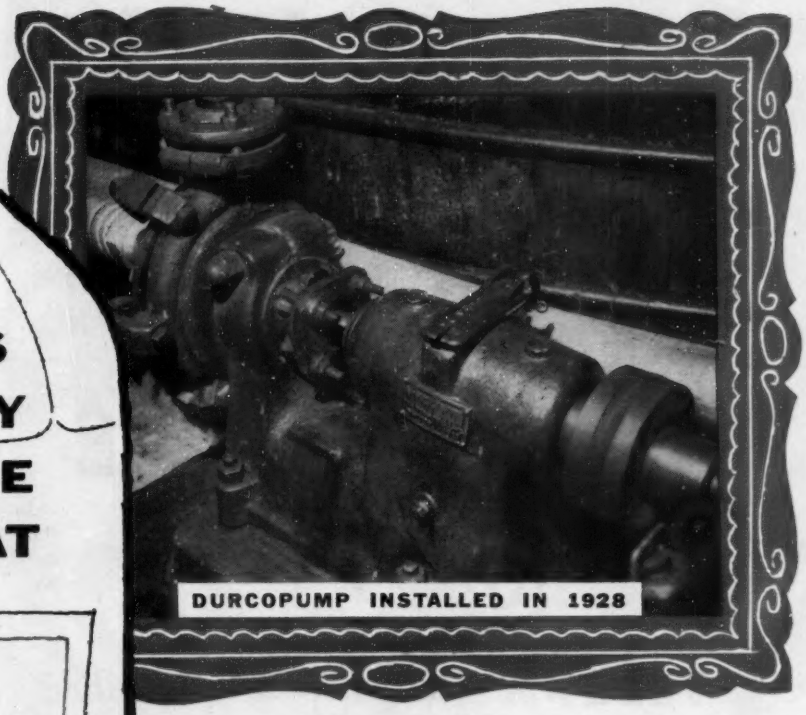
Weekly Check: Protection of those who must work with radiation daily is the first concern of the specialties firms that turn out dosimeters; consequently, these units have been most refined, made least expensive.

Essentially, they're simply squares of X-ray film, in a cardboard holder, worn on the belt, on the chest, or sometimes on the wrist. Each week, for about 50¢/unit, a service firm replaces the film, develops the exposed film, checks the amount of radiation and its types. One of the largest firms servicing the badges is Tracerlab, Inc. (Boston).*

The advantages of the badges—they give permanent records, are cheap, and will work for X-ray; beta and gamma radiation—offset some of their

*Other important badge services are Atomic Research Labs. (Santa Monica, Calif.); Isotopes Specialties Co. (Glendale, Calif.); R. S. Landauer Jr., and Co. (Park Forest, Ill.); Nuclear Consultants, Inc. (Long Island City, N.Y.); Nuclear Inst. and Chemical Corp. (Chicago); Radiation Detection Co. (Palo Alto, Calif.); R-C Scientific Co. (Playa del Rey, Calif.); St. John X-Ray Lab. (Califon, N.J.); Technical Associates (Burbank, Calif.); Technical Operations, Inc. (Arlington, Mass.).

DURCOPUMPS



DURCOPUMP INSTALLED IN 1928

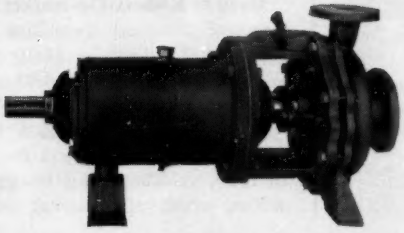
28 YEARS OF STEADY CORROSIVE SERVICE AT

NATIONAL
FRUIT
PRODUCT
COMPANY
INCORPORATED
Eastern Division
GLASSBORO,
NEW JERSEY

...and still full of *Vinegar!*

The DURCOPUMP shown above in vinegar service, was installed in 1928 in what is now The National Fruit Product Company's Eastern Division plant. It has been in steady service ever since; surviving a fire in 1932 which all but destroyed the plant. It has not been repacked in the last five years!

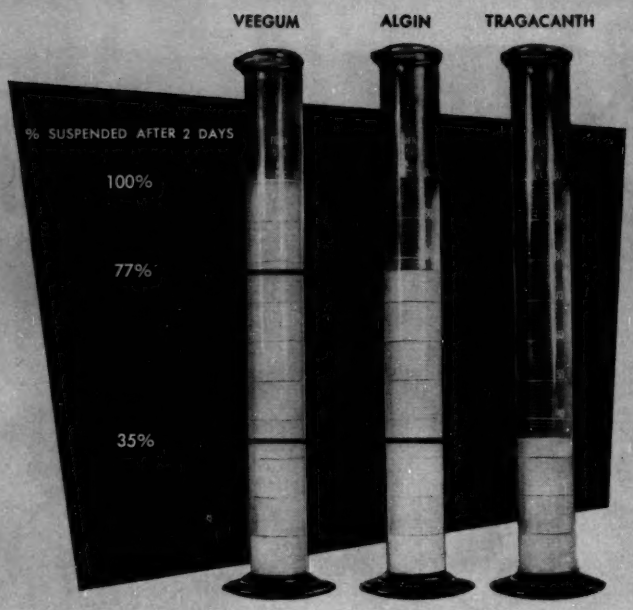
DURCO products are designed for long life and trouble-free service. For the answers to your corrosives handling problems, call or write



Series H DURCOPUMP

THE DURIRON COMPANY, Inc.
Dayton, Ohio

BRANCH OFFICES: Atlanta, Baltimore, Boston, Buffalo, Chicago, Cleveland, Dayton, Detroit, Houston, Knoxville, Los Angeles, New York, Philadelphia, Pittsburgh.



VEEGUM *keeps solids suspended*

The test — a comparison between the suspending ability of Veegum and commonly used organic agents. **The method** — 4 g of talc (R. T. Vanderbilt Co. Nytal 300) were suspended in 100cc each of aqueous dispersions of Veegum and organic gums at 65 centipoises. All suspensions were given 2 days to settle. **The results** — Veegum held from 28% to 300% more talc suspended than any organic gum tested. Similar results were obtained with pyrophyllite, clay, colloidal sulphur and such organic compounds as DDT.

VEEGUM is purified colloidal magnesium aluminum silicate. Thixotropic properties and a tendency to thicken slightly with heat account, in part, for its superior suspending and emulsifying qualities. In water systems, Veegum disperses hydrophobic materials without lowering surface tension. Less than 1% Veegum permanently stabilizes emulsions of many types of oils, fats and waxes. Aqueous dispersions of Veegum are compatible with alcohols, polyglycols and other organic solvents, and certain electrolytes. Try Veegum in your own laboratory*. It will give you higher solids suspensions at lower viscosities with improved stability, texture and consistency. Easily-prepared Veegum is non-toxic, nonirritating, opaque, white, odorless and tasteless.

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shortcomings—slow readings (it's a week before a worker learns if he's had a safe or unsafe exposure), and time of exposure (it's impossible to tell just when during the week of wear that the majority of the dose was received).

For heavy radiation exposures, the firm badges won't do. In such cases, fountain pen units are employed. These are typified by devices of Keleket X-Ray Corp. (Covington, Ky.). Its units are a sort of pocket electroscope—the position of a quartz-fiber indicator in a chamber of ionized gas depends on the amount of radiation the device has received. These units must be charged at a central station (they are re-usable), and in some cases must be read at a central station, too. They are often quite expensive—in the $25-30 range. The new Bendix unit may be read directly, and is said to be workable at high altitudes, under pressure, and through a —50 to 160 F range.

Though the most widely used dosimeters are worn by personnel, other types can give protection by indicating the radiation in a given area. Electro-mechanical devices, such as Geiger-Muller counters, are most common; but special glass, which changes transparency under dangerous radiation, is another approach to the problem. Besides these silver-activated glass types, nitrogen-oxygen units have been devised; within a closed tube, the gases form brown nitrous oxide when exposed to radiation.

Just how much radiation a person can receive without harm is still under study. Current data indicates that the 0.3 roentgen maximum allowed per week is safe in practice. But as Indiana University's Hermann Muller pointed out a few weeks ago, any radiation must be regarded as having some biological effect. Most installations are careful to keep dosages to workers well under the allowable maximums, and it's felt that many industries could look to atomic plants for tips on safe plant management.

•

Road to Riches: The market for automotive chemical specialties should reach $400 million by 1960, predicts Wellington M. Langton, technical director of Permatex Co., Inc. (Brooklyn, N.Y.). He anticipates a 5% annual increase for the next five years. In 1955, vehicle owners bought $315 million worth of chemical products.

Los Angeles, New York, Philadelphia, Pittsburgh.

How Pennsalt helps **Hydrofluoric Acid** users

plan for tomorrow

Keep ahead of competition through the latest word on buying and handling HYDROFLUORIC ACID

All users of hydrofluoric acid, large and small, can learn a lot, *be saved a lot*, for their tomorrows through Pennsalt's new free counseling service. How can Pennsalt help keep *you* ahead of the game?

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You may be able to cut HF costs considerably by changing grade, container, volume, purchasing schedule, or storage facilities. Pennsalt will help you decide what's best for you.

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What's the safest, most economical method for *you* to handle hydrofluoric acid and other heavy chemicals? How to unload, dilute, store, pump, etc.? Materials for tanks, pipes? Pennsalt has the answers for you—free.

GET SET FOR TOMORROW—NOW! Hydrofluoric acid is being used in more and more chemical and nuclear processes every day. Keep ahead—call the nearest Pennsalt office or send the coupon—no obligation.

USERS OF CAUSTIC SODA, CHLORINE, AMMONIA: You too can best plan for tomorrow with Pennsalt's free guidance. Phone or use the coupon for full information.

Pennsalt Chemicals

INDUSTRIAL CHEMICALS DIVISION

PENNSYLVANIA SALT MANUFACTURING COMPANY

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Cleveland 2, Ohio—Main 1-6205
Decatur, Ga.—Evergreen 9690
Detroit 26, Mich.—Woodward 1-8051
Paterson 1, N.J.—Lambert 5-3500
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Pittsburgh 19, Pa.—Atlantic 1-5233
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Industrial Chemicals Division 303
Pennsylvania Salt Manufacturing Company
Three Penn Center Plaza, Philadelphia 2, Pennsylvania

Please send a representative to discuss with me our company's plans for tomorrow involving heavy industrial chemicals.

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Company_____

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TANTALUM... there are many kinds of "costs" ...but only one true COST

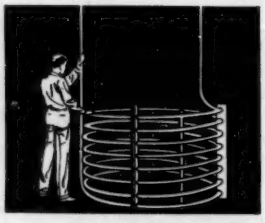
The cost of chemical processing equipment can be measured by the pound, by the square foot, by the unit, or by other yardsticks. Only one cost, however, is truly significant or all inclusive: the equipment cost per pound or ton of product per year.

Tantalum, being immune and not merely "resistant" to acid attack, is an attractive material of construction from an over-all cost standpoint. Properly used, it eliminates corrosion, product contamination, undesirable side reactions; it also decreases down time and maintenance costs. It has excellent heat transfer properties and is not damaged by thermal shock. It is light in weight, easily installed, requires no elaborate framework.

For low over-all costs in process equipment, look into Tantalum. The experience of Fansteel engineers will be a valuable supplement to your own technical staff.

USE TANTALUM WITH ECONOMY for most acid solutions and corrosive gases or vapors.

Not recommended for HF, strong alkalis or substances containing free SO_3.



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Chemical Equipment Division
NORTH CHICAGO, ILLINOIS, U.S.A.

G564A

SPECIALTIES. . . . .

EXPANSION

Adding Gloss: Wyandotte Paint Products Co. has purchased F. J. Donahue Varnish Co. (Detroit). The operations of both concerns are similar; and both will continue to operate as before.

•

Auto Trip: Mal Manufacturing Co. (Akron, O.), maker of automotive, janitorial and laundry compounds, has moved into a new building with three times the operating area of the old plant.

•

For the Future: Roselux Chemical Co., Inc. (Brooklyn, N.Y.), maker of Rose-X household cleaning products, has bought 100,000 sq. ft. of land with a railroad siding at Jamaica, L.I. A 50,000-sq.-ft., one-story building to house plant and offices will be erected.

•

Wood Work: Desmond Bros. Paint Co. (Los Angeles) has purchased the bulk terminal property, including eight storage tanks, of Standard Oil Co. of Ohio, at Alliance, O. It will manufacture a wood finish product at that site for distribution east of the Rocky Mountains.

•

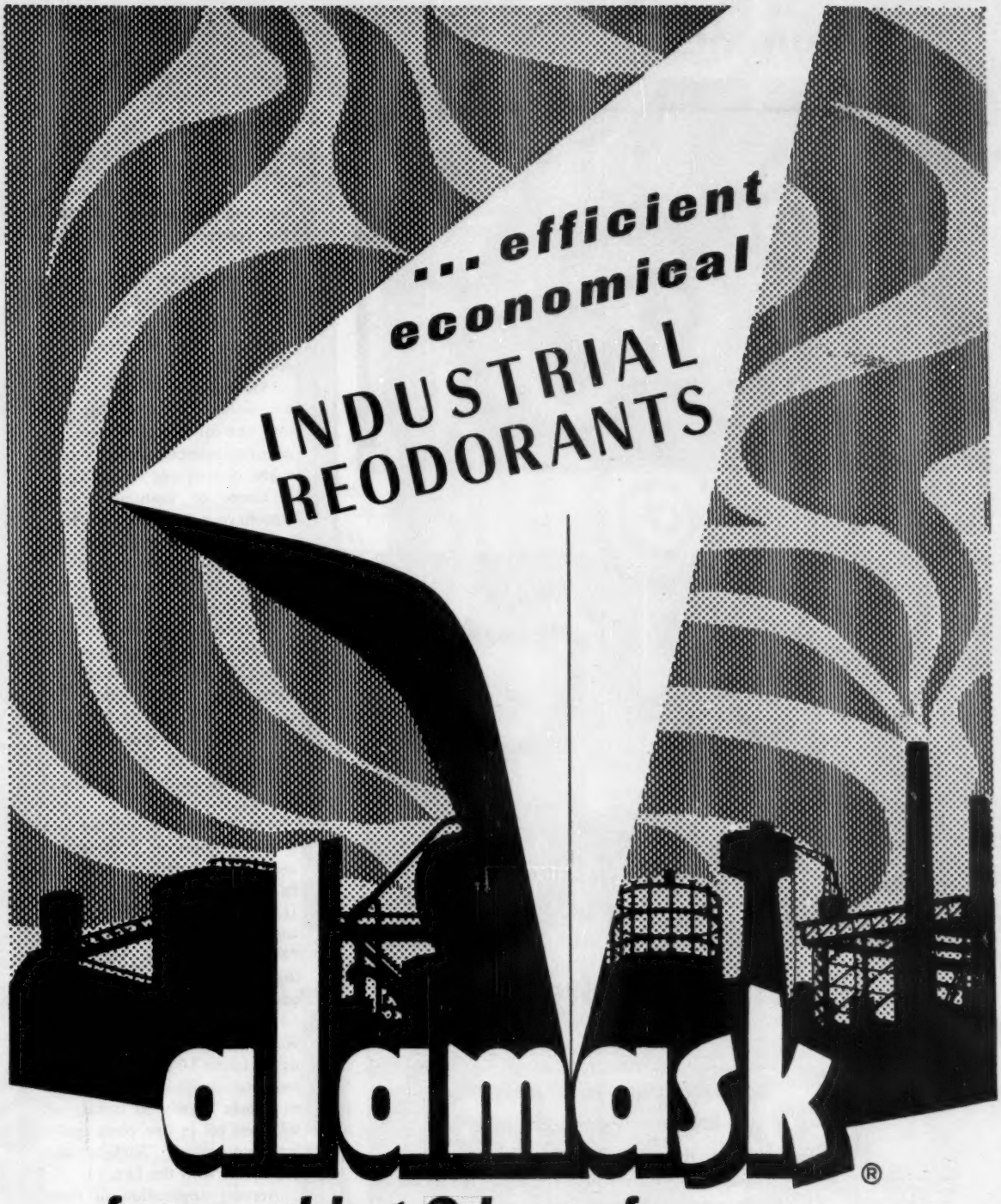
New Line: Sprayon Products, Inc. (Cleveland), maker of aerosol products, is expanding its plant 37,000 sq. ft. for installation of a new aerosol packaging line.

PRODUCTS . . . .

Wrap-up: Scott Paper Co. is introducing Wonder Wrap, an all-purpose food wrap, in Columbus, O. The product looks like wax paper, but has a thin film of polyethylene plastic that helps keep food fresh.

•

Durable Nitrogen: Granular-type fertilizers containing long-lasting organic nitrogen are said to be possible for users of N-dure, a new urea-formaldehyde solution developed by Nitrogen Division, Allied Chemical & Dye Corp. (New York). Complete fertilizers in which the nitrogen is released to plants over an entire growing season can be made, the company says, eliminating leaching, burning and late-season replacement problems. Lawns, gardens and specialty crops are expected to benefit most.



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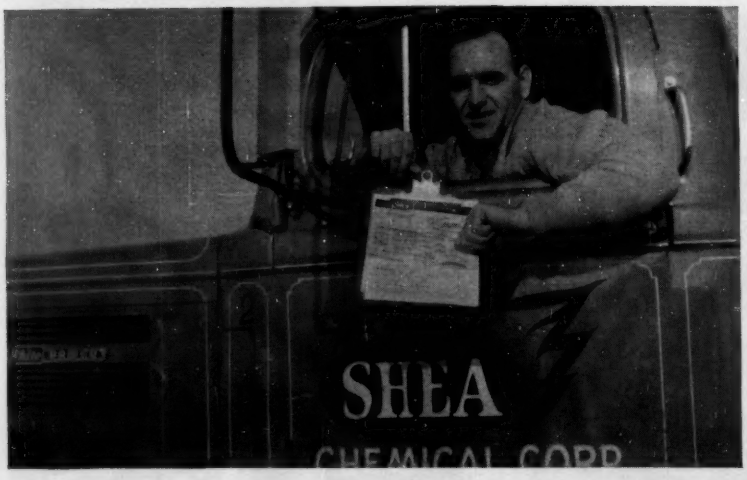

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They END in *your* production line.

All of the operations in between are Shea-controlled — your assurance of undeviating quality . . . uninterrupted supply.

It's this *all-the-way control* that assures you of getting what you want, when you want it.

Sodium Tripolyphosphate
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Watch for

. . . a new kind of tarnish inhibitor that will be offered to the following potential customers.

Manufacturers who have the problem of keeping polished silver, brass and bronze articles protected until they reach the consumer.

Storekeepers — and housewives—who want to keep sterling and silver-plated ware tarnish-free without special storage cases, or frequent repolishing.

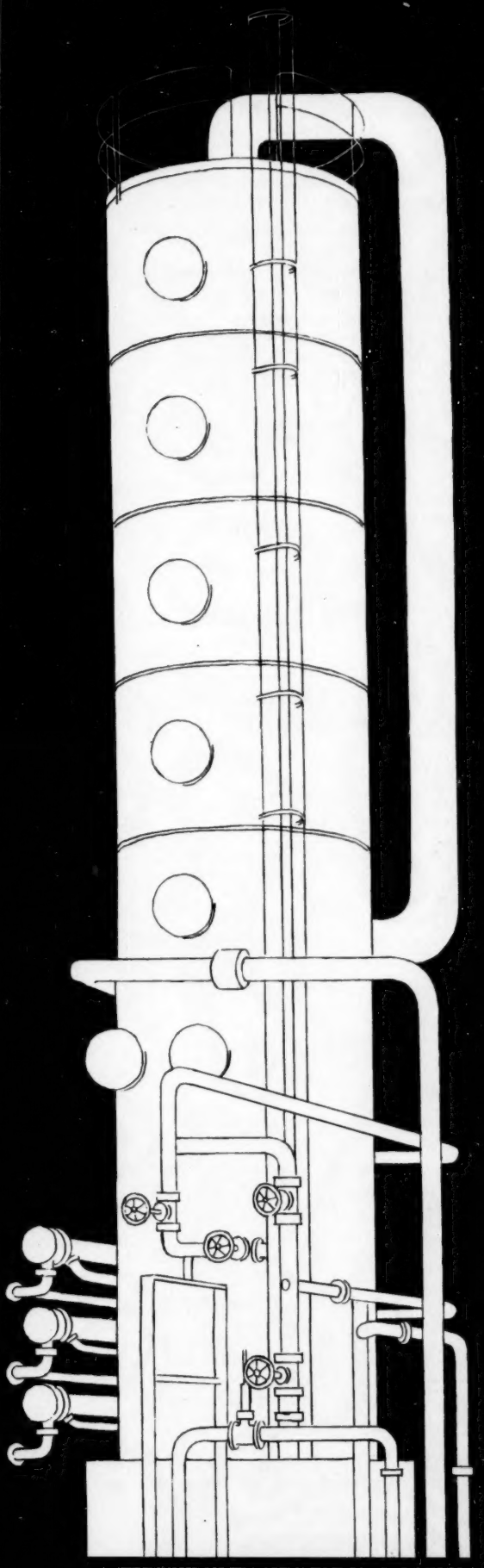
Users of costume jewelry who have a dual problem: keeping their jewelry glittery; and (quite often) preventing skin-irritation induced by low-cost jewelry metals.

Seeking to provide a cure is a protective coating that will soon be available in aerosol form. It's an easily applied, thin, colorless, transparent film that adheres firmly to metal but can be washed off simply by immersing in a hot solution of detergent and water.

Du Pont kicked off the idea a few months ago, suggesting aerosol formulations based on its Elvalan vinyl copolymer (*CW, Jan. 14, p. 72*). And last week, I-Sis Chemicals, Inc. (Stamford, Conn.) began selling its strippable coating for pressure-packing. Tagged I-Sis 88, the new liquid ($3.50/gal.) is solvent-based. Aerosol sprays dry in about 10 minutes at room temperature. The film is claimed to adhere tightly to metal, yet will peel off in one piece under hot tap water. Surface dirt comes off with the film.

Aerosol application of these coatings isn't necessary, of course. Silverware makers can buy the lacquers in bulk, apply them by any convenient method.

Both Du Pont and I-Sis are working to interest more specialties makers in their formulations; first products in aerosol form should be on the market within a few weeks.



PITTSBURGH INDUSTRIAL CHEMICALS

INDUSTRIAL CHEMICALS DIVISION
PITTSBURGH COKE & CHEMICAL CO.
PITTSBURGH 19, PA.

PITTSBURGH—Your single, basic source for quality controlled INDUSTRIAL CHEMICALS

Through the *single* sales organization of its recently created Industrial Chemicals Division, Pittsburgh Coke & Chemical Company now offers you one of the nation's most complete families of coal-derived industrial chemicals and plasticizers.

To Pittsburgh's traditional guarantee of assured product quality and reliable supplies you can now add these additional reasons for calling on Pittsburgh for your industrial chemical needs:

1. More concentrated sales service.
2. Increased technical service.
3. Vigorous new product development program by a full time development group.
4. Increased production capacity to meet expanding customer needs.

Use the following product listings as your check sheet for the high purity industrial chemicals and plasticizers you need. You'll find it pays, more than ever, to do business with Pittsburgh . . . because Pittsburgh is *basic* . . . and Pittsburgh is *growing!*

	PRODUCT	USES	DESCRIPTION
INTERMEDIATES	PHTHALIC ANHYDRIDE	Alkyd resins Plasticizers Polyester Resins Dye intermediates Other organic chemicals	Shipped in 80 lb. bagged flakes and molten tank cars (100,000 lbs.) and tank trucks (40,000 lbs.)
	MALEIC ANHYDRIDE	Polyester, alkyd and vinyl resins Rosin modified resins Dyestuffs Pharmaceuticals Textile chemicals Synthetic tanning agents	Shipped in Leverpak drums (250 lbs. net weight).
	FUMARIC ACID	Polyester resins Alkyds Rosin esters Modified phenolics Pentaerythritol esters	Shipped in Leverpak drums (250 lbs. net weight).
TAR ACIDS	PHENOL	Plastics and resins Adhesives Intermediates Pharmaceuticals Herbicides Lubricating oil refining	39°C, 95%, 90-92%, 82-84%. Shipped in drums (approx. 470 lbs. net), tank trucks, (4,000 gals.) and tank cars (4,000, 8,000, 10,000 gals.)
	ORTHO CRESOL	Plastics Resins Insecticides Refining of lubricating oils	30°C M.P., 25-28°C M.P. Shipped in tank cars (4,000, 8,000, 10,000 gals.), tank trucks (4,000 gals.) and drums (approx. 470 lbs. net).
	META PARA CRESOL	Plastics Resins Plasticizers Varnishes	3°C and 12°C. Shipped in tank cars (4,000, 8,000, 10,000 gals.), tank trucks (4,000 gals.) and drums (approx. 470 lbs. net).

INDUSTRIAL CHEMICALS DIVISION

	PRODUCT	USES	DESCRIPTION
AROMATIC HYDROCARBONS	BENZENE	Styrene Plastics Organic chemicals Insecticides Dyestuffs	Nitration Grade. Shipped in barges (250,000-300,000 gals.) and tank cars (8,000-10,000 gals.)
	TOLUENE	Solvent or diluent for protective coatings Explosives Dye intermediates Pharmaceuticals Polyurathanes	Nitration Grade. Shipped in tank cars (6,000, 8,000, 10,000 gals.)
	XYLENE	Solvent or diluent for protective coatings Organic chemicals Dyestuffs	3°C and 5°C. Shipped in tank cars (6,000, 8,000, 10,000 gals.)
TAR BASES	PYRIDINE	Pharmaceuticals Dyestuffs Rubber chemicals Water repellents Versatile solvent, acid acceptor and catalyst	2°C, 10°C, 15°C, 20°C. 2°C shipped in tank cars (35,000 lbs.) Other grades shipped in drums (approx. 450 lbs. net).
	ALPHA PICOLINE	Pharmaceuticals Dyestuffs Rubber chemicals Solvent in various processes	Shipped in drums (approx. 450 lbs. net).
	BETA GAMMA PICOLINE	Vitamins Pharmaceuticals Textile waterproofing agents Textile specialties	Shipped in drums (approx. 450 lbs. net).
INORGANICS	SULPHURIC ACID	Pickling and cleaning metals Fertilizers Textiles Organic and inorganic chemicals Processing of leather, textiles and petroleum	66° Be. Shipped in tank cars (50 tons), and tank trucks (18 ton minimum), and barges (750 tons).
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Drums Don a Poly Coat

For years, Delaware Barrel & Drum Co. (Wilmington, Del.) has been doing a nice little business in lining drums with polyethylene (CW, Nov. 3, '51, p. 42). But it has steadfastly refused to disclose how it applies the lining. A patent (U.S.P. 2,737,461), just assigned to the firm, reveals the secret: tumbling powder through preheated drums.

The technique itself isn't new. But so far, at least, DB&D is the only one to make it work on a large scale.

Though it's not the first attempt to line metal containers with polyethylene (American Agile developed a flame-spray method in 1950), DB&D's coating process offers several advantages that recommend it for commercial use. For one thing, it permits application of heavier coatings (8-30 mils) than the 1- to 2-mil thicknesses formed by flame-sprayed plastic. And for another, it's less critical to operate, doesn't call for the highly skilled labor required for flame gun operation.

In one respect, DB&D's drum-coating process is similar to recently developed fluidized polyethylene coating methods (*CW, Dec. 3, '55, p. 93*)—i.e., the metal to be coated supplies the heat to fuse granular polyethylene into a smooth, continuous protective coating.

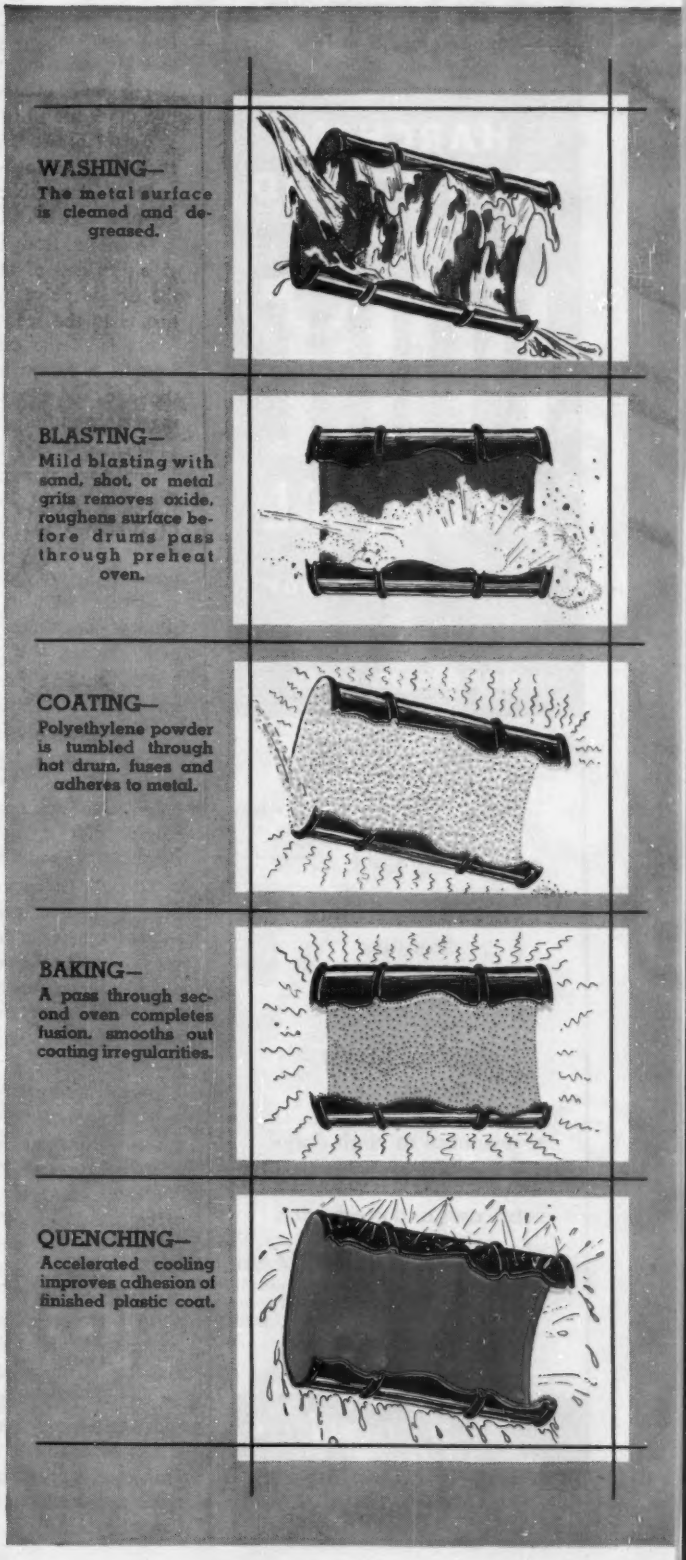
Processing begins with conditioning of the metal surface. Drums are washed, degreased and/or pickled to provide a surface that's completely free of surface soils and oxide scale. Then, to improve adhesion of the coating, the metal is roughened slightly by mild blasting with sand, shot or metal grit.

After surface conditioning, the drums are conveyed through an oven to be heated to the proper temperature for the coating operation. Conditions in this step are critical—the metal must store up sufficient heat to remain above the melting point of polyethylene throughout the entire coating buildup operation; but temperature must remain below that at which the ethylene polymer chars or decomposes.

The optimum temperature, which depends on the thickness or cross-section of the metal and required coating thickness, ranges from 350 to 475 F for drums of 12- to 18-gauge sheet metal.

Coating Technique: Immediately after preheating, the drums are coated with polyethylene powder, which flows through as drums are rotated in a slightly inclined position. It's in this step that experience and know-how play a vital role.

The powdered plastic must be applied in such a way that particles in immediate contact with the hot metal surface soften and fuse into a single layer. As fresh particles come into contact with this base layer, heat transfer must be rapid enough to cause them to melt


WASHING—
The metal surface is cleaned and degreased.
BLASTING—
Mild blasting with sand, shot, or metal grits removes oxide, roughens surface before drums pass through preheat oven.
COATING—
Polyethylene powder is tumbled through hot drum, fuses and adheres to metal.
BAKING—
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QUENCHING—
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and become an integral part of the coating. Heat transfer and uniform distribution of the particles are assured by the wiping action of excess powder as the drum rotates.

The use of excess powder also serves two other useful functions: it provides sufficient pressure to consolidate softened particles into the coating; it acts as an insulating blanket to retard cooling of the metal.

Overflow troughs extend inwardly at either end of the drum to receive the excess polyethylene, which is returned to the feed hopper for re-use. The lips of the drum rotate in these troughs to insure thorough coating at the apex of the chimes—the points most prone to coating failure.

When coating has built up to the required thickness, the drums are baked for about 20 minutes at 400 F to complete the fusion and smooth out irregularities of the coating. The presence of oxygen in the oven atmosphere is also said to improve scratch resistance of the hardened plastic lining.

The coating process ends with a quench (water spray or cold air blast) that safeguards adhesion by causing the metal to contract faster than the coating. Finished drums are then spark-tested for coating porosity, and closed with drum ends (previously coated in a similar manner).

Though Delaware Barrel & Drum admits that it has made significant improvements in the basic process, it's reluctant to describe them. It does emphasize, however, that processing of the polyethylene powder to the proper spherical shape and size is an essential factor.

Liners Compete: Though the low cost (about $12) of a one-trip, plastic-coated drum makes it an attractive alternate for expensive stainless steel containers and breakage-prone glass carboys, the fused-in-place linings won't lack for completion. Various types of resin coatings offer cheaper protection (about 75¢/coat) against many corrosive chemicals. And insert-type polyethylene liners are also bidding for chemical shippers' dollars.

Competing against its own fused coatings, DB&D makes a molded insert of ¼-in.-thick, rigid polyethylene. This liner is reusable, costs more than twice as much as coating. Jones & Laughlin, too, will soon be out with a competitively priced, drum-size version of the JaLiner (now made only in 5-gal.-pail size). Though not a rigid insert, the JaLiner is molded to container shape, is thicker (10 mils) than common polyethylene bag liners.

Storm Warnings Up

The highly touted barges to ship methane as a liquid (*CW Technology Newsletter, Oct. 22, '55*) may run into some stormy weather in getting Coast Guard approval. The idea is to utilize the pressure of the natural gas in the well to help the gas liquefy itself. Liquefaction causes the methane to shrink to 1/600th of its gaseous volume. This would enable methane to be shipped at costs that compare favorably with piping costs.

Although Willard Morrison, a Chicago consultant, originally engineered the project for the Union Stock Yards, Continental Oil has taken an interest in it. And a special corporation, Constock Liquid Methane Corp. has been set up for the project.

The trouble is that the same shrinkage that makes the idea so attractive also makes liquid methane a serious explosion threat—unless it's properly handled. And indications are that the Coast Guard may take a dim view of Morrison's idea of lining the inside of the tanks with balsa wood.

Last week, a special subcommittee of the American Petroleum Institute met in Washington to draft a set of proposed safety regulations for hauling liquid methane. When they're drawn up, the proposals will be submitted to the Coast Guard to aid in writing final regulations.

Reports on the progress of the barge tests have been skimpy. But there's talk that the balsa linings are not completely satisfactory. Glass fibers and other insulators are being mentioned as alternates.

But Morrison himself has no doubts about safety. In fact, he has carefully calculated the amount of insulation needed to give controlled evaporation in transit. This would permit a portion of the methane being shipped to power the barges.

Meanwhile, the chemical industry is closely watching the proceedings. For although it has little interest in drilling for or shipping natural gas, it does have a big stake in it as a raw material.

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ALUMINA (Al_2O_3)	.21	.20	.19
LIME (CaO)	55.00	54.90	55.40
MAGNESIA (MgO)	.65	.62	.51
SULPHUR (S)	.012	.011	.015
PHOSPHORUS (P)	.006	.006	.009
IGNITION LOSS	43.20	43.50	43.20
CALCIUM CARBONATE (Calculated)	97.90	97.72	98.51
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* Report prepared by Pittsburgh Testing Laboratories, Pittsburgh, Pa.

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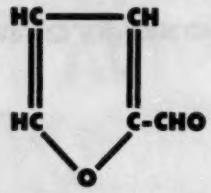

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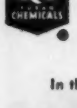

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PRODUCTION

Sizing Up Badische's Oxythermal Carbide Process

Pro . . .	Con . . .
• It eliminates need for large amounts of electric power.	• It couldn't compete with cheap electricity.
• Almost pure carbon monoxide is produced as a by-product.	• Without a ready market for CO, it wouldn't bear much of the operating costs.
• It yields high-purity carbide, purer than the arc-furnace product.	• Product purity alone wouldn't justify change from electric arc method.

Putting the Heat on Power

Ever since modern air-separation techniques made tonnage oxygen plentiful and economical, it has been waging a successful campaign to win chemical process applications. Already it is a vital factor in several oxidation processes*; and in Germany it's now challenging electric power's hold over calcium carbide production.

Chances are that the oxythermal carbide process won't find many backers among U.S. producers who have access to abundant, cheap electric power. But the alternate route to carbide is an interesting example of how oxygen may be able to pinch-hit for electricity in other high-temperature processes now limited to electrothermal methods.

The oxythermal carbide process claims a dual advantage over the conventional electric-furnace method: higher yields, purer product. Badische Anilin- & Soda-Fabrik developed the new method, is now polishing it in a 70-tons/day pilot plant at Ludwigshafen, Germany.

Heart of the oxythermal process is a graphite-lined shaft furnace, similar in operation to a blast furnace. Raw materials charged to the oxygen-burning plant consist of lime and coke, the same diet that is given to arc furnaces. But unlike the latter, which requires a 10-15% excess of lime, the oxythermal process calls for a large excess of coke to provide the high heat of combustion required for the reaction.

Oxygen is introduced to the furnace through air-cooled jets, reacts with coke in the interior of the charge. At the periphery of the charge, the lime, coke and carbide sinter into a solid mass that protects the graphite lining and walls of the furnace from thermal stress. Liquid calcium carbide is periodically tapped from the bottom of the furnace with the help of a special burner.

Hotter with Oxygen: Key to both the economic and technical feasibility of the oxythermal process is the availability of cheap tonnage oxygen. For one thing, pure oxygen raises the combustion temperature of coke (1170 C in 20% O_2 to 3210 C in 100% O_2) to the range previously attaintable only by the electric arc. This intense heat is necessary to assure the reaction of carbon and lime, to yield the carbide in liquid form.

Extreme heat also safeguards the high purity of the product. At the reaction temperature, oxidation of carbon yields carbon monoxide, principally. Formation of by-products (carbon dioxide, water) that would attack the carbide is prevented. Another advantage of this type of operation: by-product gas is almost pure carbon monoxide, can be recovered and used for preheating the raw material charge. The waste gas is, in fact, an important factor in the economic evaluation of the oxythermal process.

*e.g., partial oxidation of ethane to ethylene, partial oxidation of natural gas to acetylene, direct oxidation of acetaldehyde to anhydrous acetic acid.

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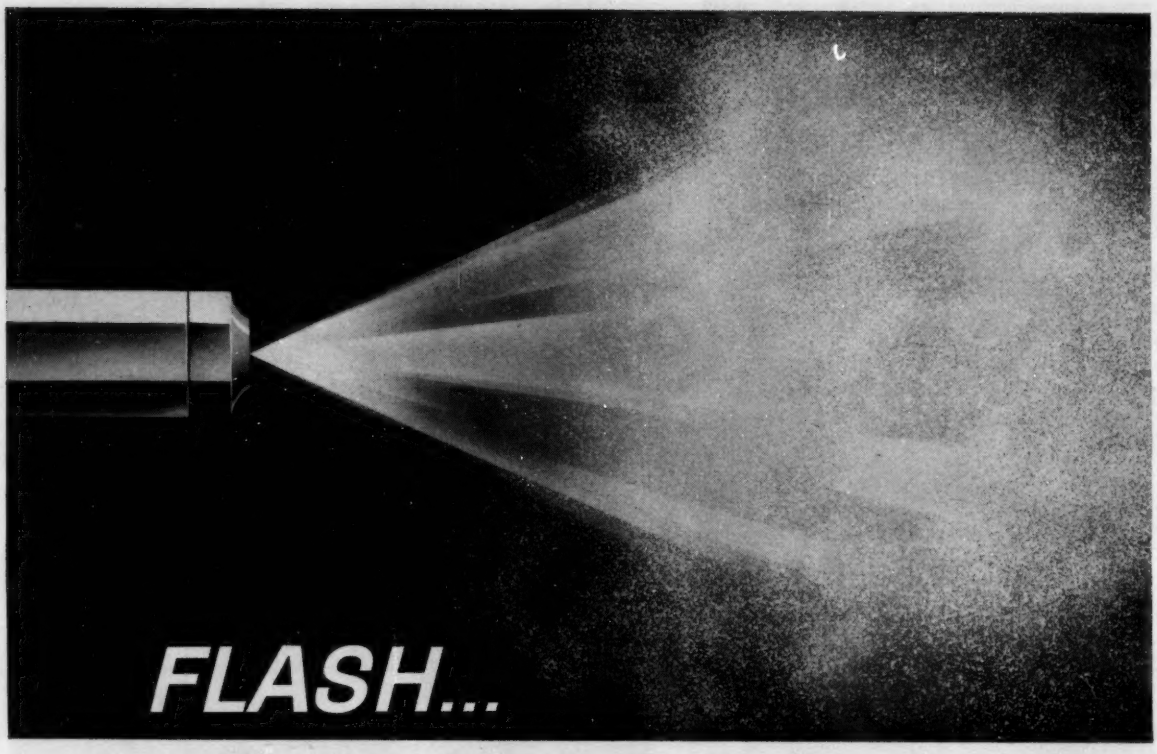

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PRODUCTION. . . . .

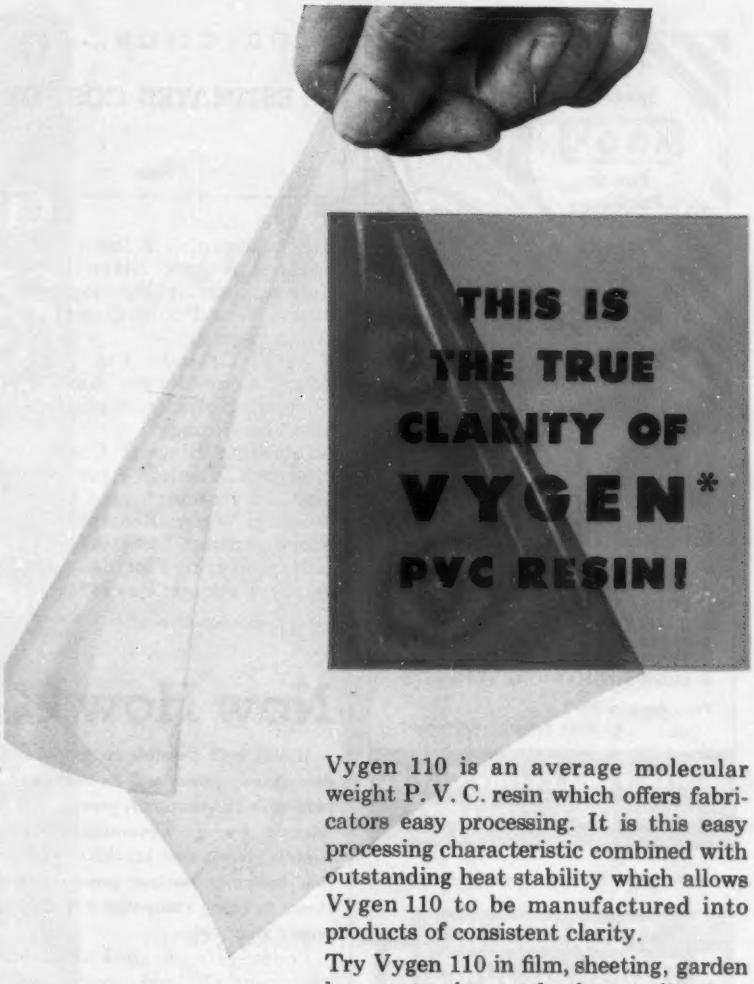
In Germany, where many plants use carbon monoxide as a starting material, gas recovery might bear a considerable portion of the operating costs. In this respect, says BASF, the oxythermal operation could be regarded as a gasification process in which the valuable carbide is obtained as a slag. But U.S. producers doubt that gas recovery would outweigh the advantage of cheap electric power.

Contamination with unreacted lime limits carbide concentration of the electric furnace product to about 83%. Higher concentrations would not be economical, because excess coke increases the electrical conductivity of the charge to the point at which power utilization becomes inefficient.

This limitation is avoided in the oxythermal process by maintaining a constant excess of coke. In fact, the oxygen-to-coke ratio normally used is such that most of the ash components in the coke (silicon and aluminum compounds) are volatilized and carried out in the by-product carbon monoxide gas. And iron compounds in the ash are reduced to ferrosilicates, which can later be removed from the carbide.

Established Competition: Despite the proved advantages of the oxythermal process, it's doubtful that it will take over existing electrothermal installations, especially where the latter have access to cheap electric power. For, as carbide producers point out, both processes consume about the same amount of coke (assuming that coke is burned to generate electric power for the arc furnace), and the carbon monoxide by-product of the oxythermal plant would be a factor only if there were a ready market nearby (e.g., a Fischer-Tropsch synthesis plant).

Looking beyond the firmly entrenched opposition, BASF sees many opportunities ahead for oxythermal processes. Its Ludwigshafen pilot plant has already topped the 78% over-all efficiency of electric carbide plants, and the company believes that larger units could be operated at even greater efficiencies. What's more, says BSAF, the high-temperature combustion principle may also be suitable for the production of ferroalloys and phosphorus in power-short areas, particularly in those where supplies of high-grade coke are dwindling.



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Now How Close Is A-Power?

It still isn't possible to pinpoint the date atomic power will be able to compete with conventional power. But the Atomic Energy Commission's Louis Roddis gives a cost breakdown (above) that indicates nuclear power is a lot closer to being competitive than many power men realize.

Roddis gave his breakdown before the recent California convention of the American Public Power Assn. For purposes of comparison, he used these nonnuclear power costs worked up by the AEC engineers:

- Large steam plants (averaging 224,000 kw.), $700/kw.
- Small plants (averaging 36,000 kw. in four units), $1,200/kw.
- Diesel plants (averaging 4,500 kw. in four units), $1,700/kw.

The corresponding range for nuclear power plants is $220-960/kw. Said Roddis: "I can see you are already comparing the conventional figures with nuclear figures . . . it encourages me to find that the first cost of nuclear plants, by and large, appears to be getting down under total costs for conventional plants."

At the same time, he warned that nuclear costs are for "paper" plants, although, he declared, they are undoubtedly very close to what actually can be attained at this time.

The Missing Quantity: The big still-to-be-answered question concerning nuclear power costs: How much will operation of these plants cost? And this is one area that Roddis deliberately avoided.

"Operating costs," he said, "which depend very much on fuel element life, are much less dependable; indeed, they are quite speculative. This is why I have not and will not make operating cost estimates at this time.

"It seems to me that nuclear plant development is now bringing the first costs of these plants near the point where they will be allowable in a competitive installation, and that the biggest unknowns are in the region of operating costs. Of course, only actual operation of nuclear plants will determine their operating costs with any degree of validity. Hence, it is most important that we get along with the building and operating of some nuclear power plants."

He also made the point that it was important to keep incentives before the builders and operators so that they would do a more efficient job. As he put it: "When one is concerned with economic matters, economic incentives should be retained."

EQUIPMENT . . . .

Micron Grinder: Sturtevant Mill Co. (Boston, Mass.) offers a new series of Micronizer fluid-jet grinding machines designed to reduce solids to micron size at rates up to 1½ tons/hour. The units have no moving parts, use jets

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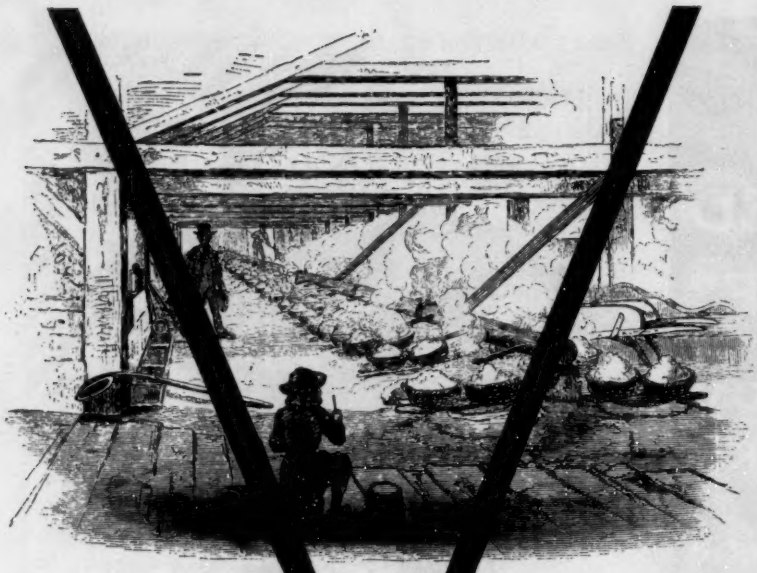

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of compressed air to cause solids to rotate at high speed, pulverize each other by impact. Grinders are made in seven sizes from a 2-in., ½-lb./hour laboratory model to the largest 30-in., 3,000-lb./hour production machine.

•

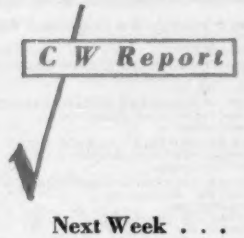
Spray Lubrication: For easy-to-apply lubrication of both metallic and nonmetallic surfaces, American Resin Corp. (Chicago) recommends its Spray Graph—a new instant-drying graphite lubricant—in 6-oz. spray containers. The material is said to provide effective lubrication at temperatures from -100 to 800 F., eliminate surface build-up, drippage and pickup of lint, dust or dirt.

•

Flow Alarm: Fischer & Porter Co. (Hatboro, Pa.) is out with a new vibrationproof flow alarm that will replace the company's standard mercury switch-type and induction coil-type instruments. Known as the F&P Ratolarm, it uses two snap-action electrical contacts, hermetically sealed in a glass tube and actuated by a magnetic float extension rod. The unit incorporates a feature to protect against failure of the alarm circuit, may be used to perform on-off control functions at predetermined high- and/or low-level float positions.

•

Horn Alarm: To prevent overfilling of petroleum, chemical and petrochemical storage tanks, Falcon Alarm Co., Inc. (Summit, N.J.) offers a new self-powered tank-overflow horn that sounds an audible warning when the liquid level reaches a safe filling limit. The float-actuated unit is powered by carbon dioxide, Freon 12, nitrogen, or



Next Week . . .

CW Report authors offer a systematic approach to corporate expansion and diversification.

BROMIDES
for chemical processing

Hydrobromic Acid

A NEW, MODERN PLANT with new exacting controls and increased capacity is now producing Hydrobromic Acid at Michigan Chemical Corporation. Greater demand for this product as a brominating agent and for the manufacture of other bromides made this expansion necessary.

Why use HBr? Because bromide intermediates, made with Hydrobromic Acid, often provide a higher yield of finished products and more economical production.

USES: Bromides, intermediates, dyes, drugs, perfumes, sedatives, photographic emulsions.

Michigan Chemical Corporation, for almost twenty years a quality producer of chemicals, offers a series of pure bromides, among them being Ethyl Bromide, Monobromobenzene, Cyclopentyl Bromide and Hydrobromic Acid, specially made for use in pharmaceutical manufacturing. Write for further information or catalog.

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compressed air; can be heard more than 1,000 ft. away.

•

Water-Vapor Analyzer: An electrolytic hygrometer capable of measuring 1 ppm. of water in air will soon be available from Beckman Instruments, Inc. (Fullerton, Calif.). Based on a design developed by Du Pont's Engineering Research Laboratory (*CW, March 10, p. 40*), the instrument continuously and automatically monitors minute concentrations of moisture, by measuring the current required for electrolysis.

•

Submersible Pump Mount: ECO Engineering Co. (Newark, N. J.) has developed a new mounting for submersible pumps. The firm says it prevents contamination of solutions by lubricant while insuring against bearing failure due to lack of lubrication. Special feature of the new mount is an all-Teflon adjustable thrust and guide bearing that's lubricated by the fluid being pumped.

•

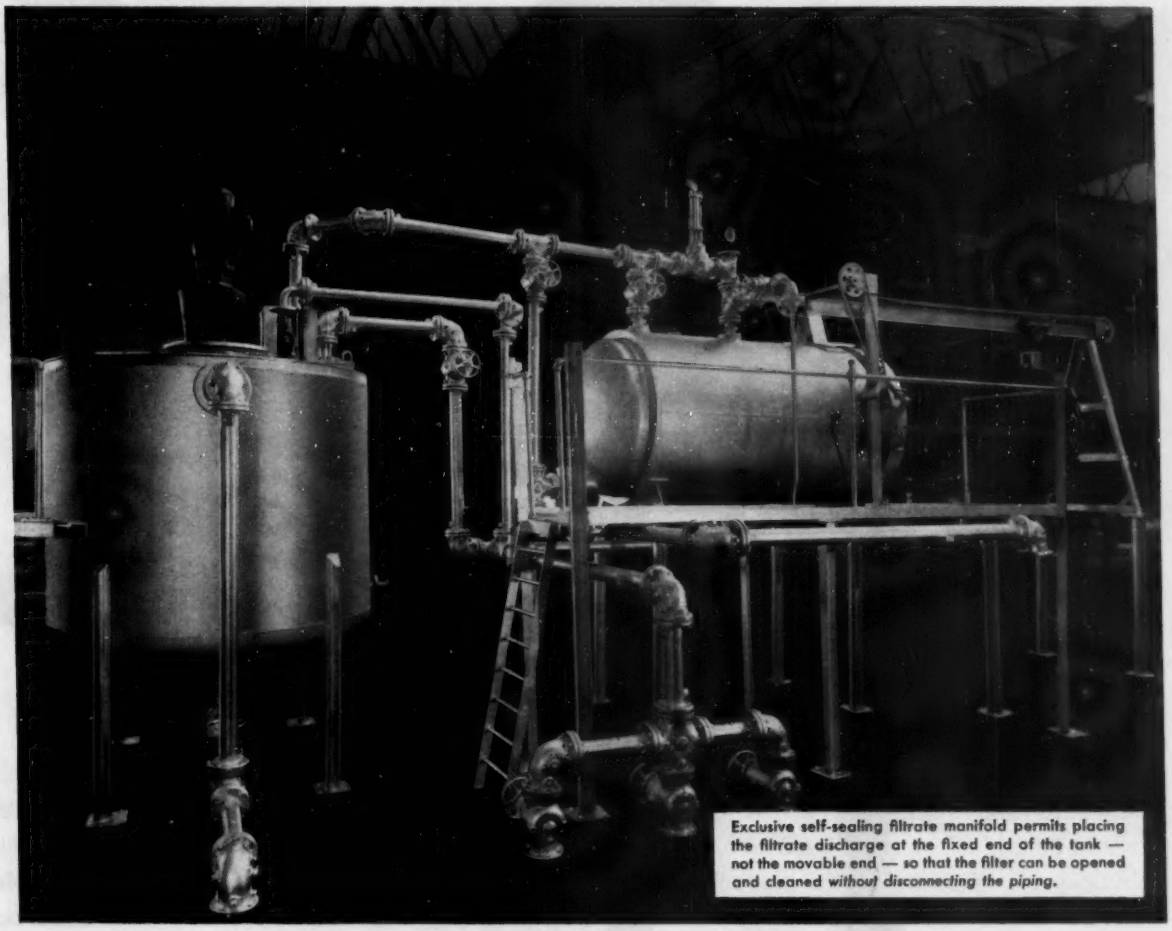
Sliding Gate: The new Universal slide valve, developed by The Allen-Sherman-Hoff Co. (Wynnewood, Pa.), is designed for use in pipelines transporting solid materials in liquids. Available in 6-, 8- and 10-in. sizes, the valves provide straight-through flow in the open position, assure tight cutoff at line pressures to 125 psi.

•

Water Softener: For low-cost, demineralized water, Enley Products, Inc. (Brooklyn) offers its new packaged Pup ion-exchange unit that attaches to any water outlet. Made of high-temperature acrylic, it comes in several sizes—from a 300-gal. model, selling for $50, to 3,000-gal.-capacity units.

•

Digital Converter: Non-Linear Systems Inc. (Del Mar, Calif.) is now manufacturing a high-speed analog-to-digital converter that counts at a speed of 400 steps/second, gives up to 20 measurements/second. Originally designed for digital recording of low-voltage aircraft transducers, the NLS Model 311 converter incorporates many features (hermetically sealed relays, temperature stability from -55 to 75 C, vibration-, shock- and humidity-resistance), says NLS, that make it well suited to many industrial applications.



Exclusive self-sealing filtrate manifold permits placing the filtrate discharge at the fixed end of the tank — not the movable end — so that the filter can be opened and cleaned *without disconnecting the piping.*

BIRD PRESSURE FILTER

All Wrapped Up In A Neat, Complete Package

What a smart, convenient, time-saving way to acquire an efficient, economical filter station!

The packaged unit pictured includes pumps, piping, valves, fittings, meters, tank and agitator — all integrated and ready to go — every part fitted for the specific application, in the above case a molten sulphur filtration system.

Bird Pressure Filter Stations are backed by the Bird Research and Development Center — a complete test plant devoted solely to the solving of solids-liquids separation problems.

You know in advance that the installation in your plant will do what you want it to do.

Why not take advantage of this complete filtration service? Ask us to work out recommendations and estimates.

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- *Bird Horizontal Tank, Vertical Leaf Pressure Filters*
- *Bird-Humboldt Screen Type Centrifugal Dryers*
- *Bird Suspended Centrifugals • Bird Centrifugal Classifiers*
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For specific information on individual machines write Bird Machine Company, South Walpole, Massachusetts Regional Offices: Evanston, Illinois • Portland, Oregon

Reach high for the tall words! Uniquely useful . . . unduplicated . . . spectacularly significant . . . CPI processing men's only practical planbook! They all smack true when you're talking about the "Annual Inventory Issue" of Chemical Engineering.

Yes, you can splatter the page with superlatives about this *one* . . . and not even the most conservative chemical engineer will say you nay. For here is the most masterfully complete reference plant operators in the Chemical Process Industries ever laid hands on.

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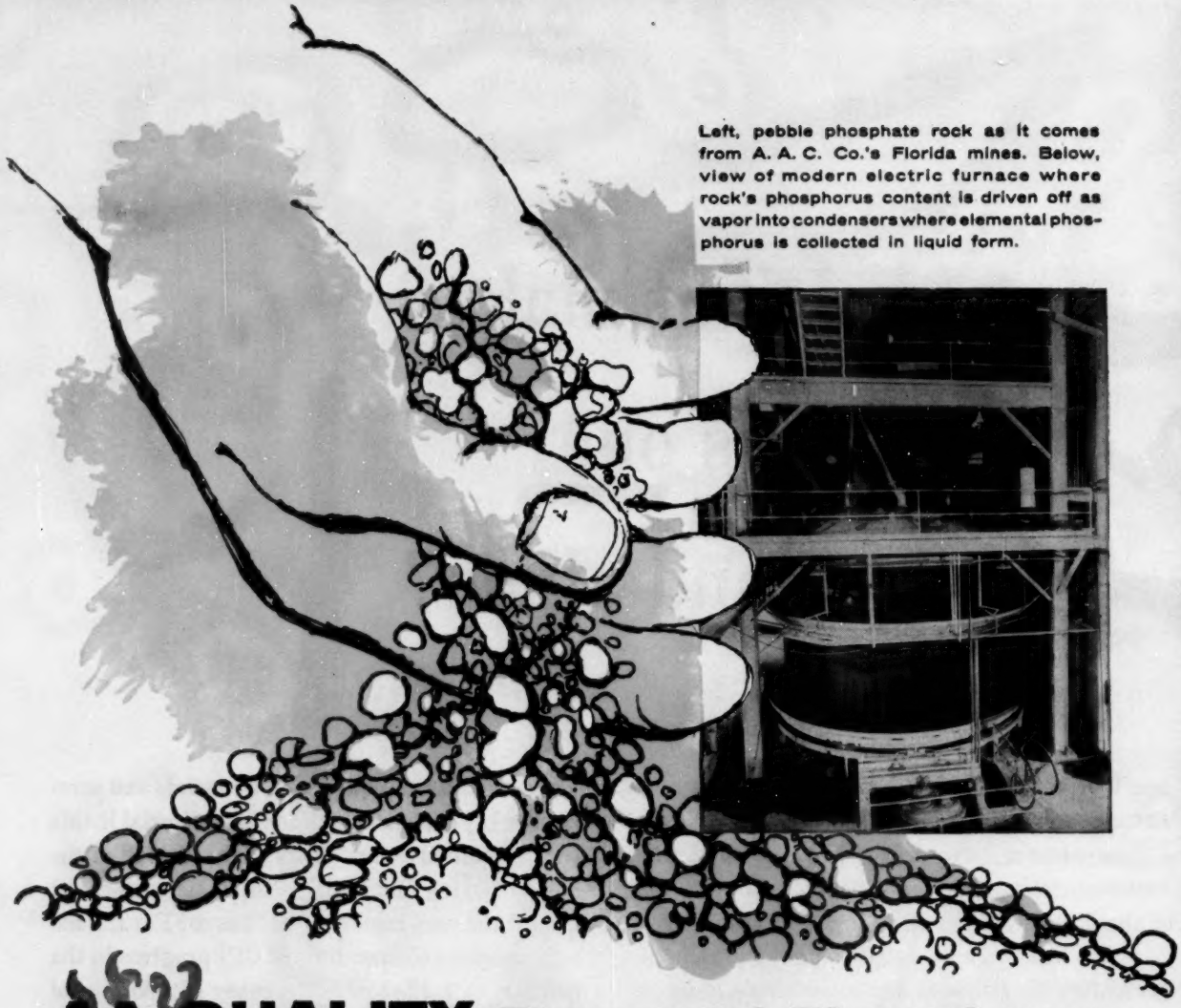

Left, pebble phosphate rock as it comes from A. A. C. Co.'s Florida mines. Below, view of modern electric furnace where rock's phosphorus content is driven off as vapor into condensers where elemental phosphorus is collected in liquid form.

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Technology

Newsletter

CHEMICAL WEEK
May 12, 1956

Fluid-bed processing of aniline will get its first commercial tryout in Cyanamid's proposed plant at Willow Island, W. Va. (*see p. 24*). The firm will employ a catalytic reduction of nitrobenzene in a fluidized reactor. The plant was designed by Chemical Construction, which until recently was a Cyanamid subsidiary (*CW, Technology Newsletter, April 21*). Line responsibility for the project will now rest with Cyanamid's new Engineering and Construction Division.

•

Add Dacron (polyester) to Hypalon (chlorosulfonated polyethylene) and you get Dacralon. And that's exactly what DeBell and Richardson (Hazardville, Conn.) has done in cooperation with the Air Force's Rome Air Development Center at Grifiss Air Force base.

The new product, Dacron coated with Hypalon, is of interest to the Air Force for radar shelters. It will permit a weight saving of more than 50% over existing proofed fabrics, is said by the Air Force to possess the highest strength-to-weight ratio of all proofed fabrics.

•

A big step forward in reserpine synthesis was reported last week by Frank Weisenborn and Patrick Daissi of the Squibb Institute for Medical Research. They prepared biologically active reserpine, deserpidine and recinnamine by introducing a hydrogen atom at carbon-atom number 3 of several reserpine-like structures.

Robert Woodward has also synthesized the product. And you can expect to hear shortly that Ciba, too, has worked up a synthesis.

•

Bell Telephone Laboratories is now moving into production of the highly touted, all-solid capacitor. The first paper on the device was delivered by the firm's R. L. Taylor last week at the 109th meeting of the Electrochemical Society in San Francisco.

The new capacitor is made of two semiconductors (manganese dioxide and tantalum dioxide), sandwiched between electrodes of tantalum and lead. Elimination of the liquid electrolyte does away with the need for a casing around the unit. This, in turn, means that there's no problem of gas venting and drying out. Net result is that the unit has an extremely long shelf life.

Also, since there's no liquid, there are no worries about freezing or boiling, so the unit may safely be operated under temperature extremes. Its temperature coefficient of expansion, incidentally, is low.

Because it has a much higher capacitance per unit volume than capacitors using liquid electrolytes, the new unit is expected to find wide use in miniaturization—particularly in transistor circuits designed to operate at low temperatures and voltages. The drawback right now is cost, which is two or three times that of conventional capacitors. But that should drop to competitive levels under volume production.

Technology Newsletter

(Continued)

Fansteel, which worked closely with Bell Labs in the development of the all-solid capacitor (*CW Technology Newsletter, April 7*), has just made them available in semicommercial quantities. Fansteel's capacitors operate on the same principle as do Bell's, although they differ somewhat in mechanical design.

•

Midwest will get its first basic brick manufacturing plant as a result of Harbison-Walker's decision to build on a 60-acre site in Hammond, Ind.

The firm has a silica-brick plant in the Midwest (East Chicago, Ind.), but has been shipping basic bricks in from Baltimore. Basic bricks are widely used by chemical processors as furnace linings.

•

Aluminum is bidding for new jobs both as a material of construction and as a participant in chemical reactions:

• Albert Raschig Labs has showed that Raschig rings, activated with mercury, are better than activated alumina shavings for alcoholic reductions of methylisobutylketone and cyclohexylamine.

• Kaiser Aluminum and Chemical is studying organic coatings for aluminum in the hope of rendering aluminum pipe suitable for use in mines. Acid in mineral waters corrodes the uncoated pipe.

•

A new generator to gasify low-grade fuels in powdered or granular form has been developed by Union Rheinische Braunkohlen Kraftsoff A.G. (Wesseling near Cologne). To speed reaction velocities and to minimize difficulties arising from soft ash, the temperature is kept well above the melting point of the ash. If kept in turbulent motion, this liquid slag transmits oxygen, also is a good heat transfer agent.

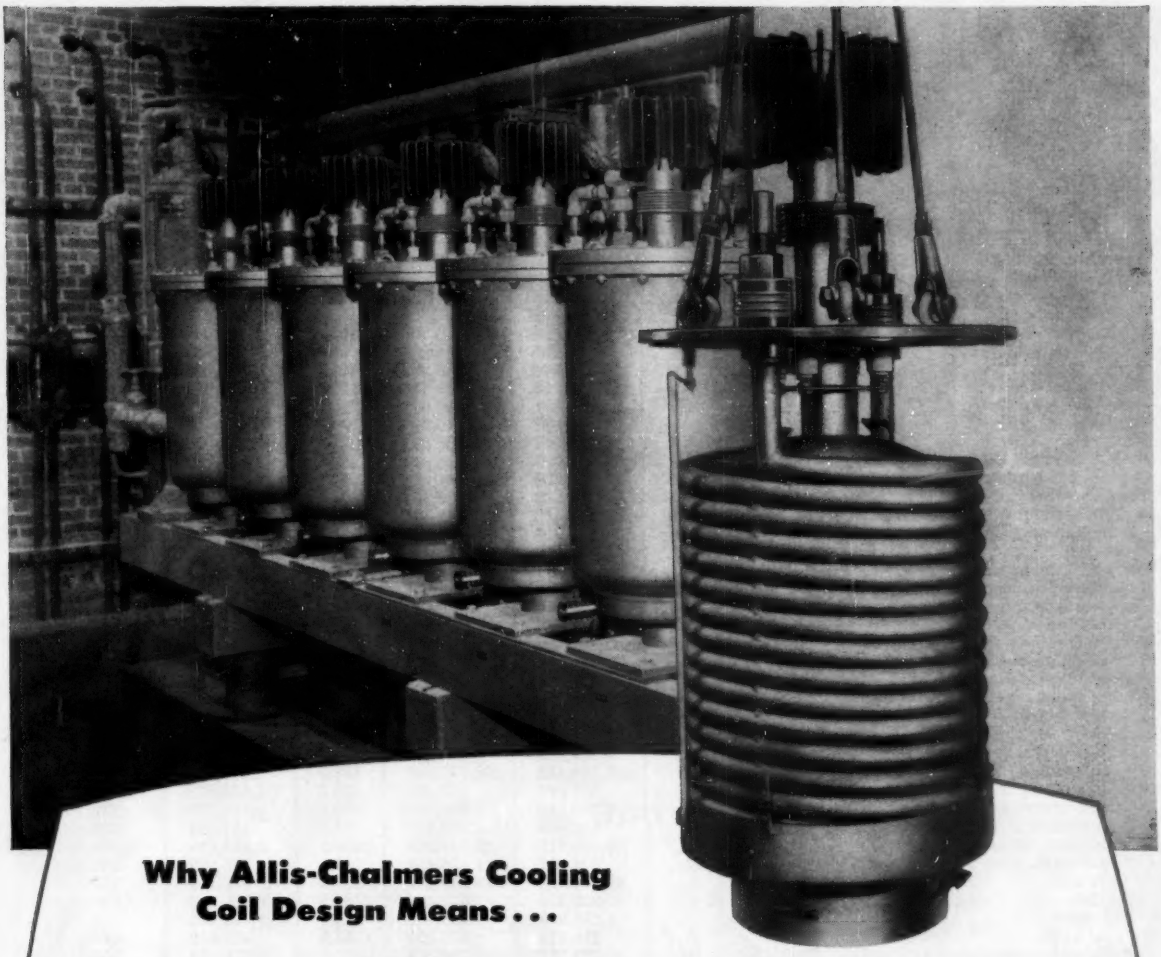
A variety of gases can be made by this technique. Blowing air through the generator produces a weak gas; a mixture of oxygen and steam yields a water gas. By using oxygen-enriched air, it's possible to get a synthesis gas suitable for ammonia production. The method is now being tried out in a small pilot plant.

•

The Atomic Energy Commission has given the nod to Babcock and Wilcox to design, fabricate and operate a liquid-metal-fueled reactor experiment (LMFRE). An acceptable contract remains to be negotiated.

Under study for several years at Brookhaven National Laboratory, the LMFRE holds the promise of simplifying fuel processing. And B&W makes it plain that Union Carbide Nuclear Co. would be a major subcontractor, primarily in the chemical processing of fuel.

The liquid metal reactor offers—potentially, at least—two other advantages: flexibility over a wide power-input range; and steam conditions comparable to those in modern steam plants.



Why Allis-Chalmers Cooling Coil Design Means . . .

Better Rectifier Operation

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Positive Arc Barrier is formed by the cooling coil, which is insulated from the tank. The main arc is confined within the coil, preventing arc transfer to the tank.

Years of Operation in hundreds of installations have proved the reliability, ease of operation, and simplified maintenance of Allis-Chalmers mercury arc rectifiers. You can get complete information at your nearby A-C office, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

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Commodity	Unit	Quantity 1955	Quantity 1954	Percent of 1954	Dollar Value 1955	Dollar Value 1954
Acetic acid—over 65%	lb.	2,805,718	1,537,663	183.0	199,958	103,700
Arsenic trioxides	clb.	14,443,828	9,695,722	149.0	765,252	544,968
Naphthenic acids	gal.	1,189,487	994,105	120.0	846,654	729,776
Ethyl alcohol	gal.	2,983,112	1,192,883	250.0	389,000	186,108
Coal-tar mixtures	lb.	16,949,384	14,569,637	116.0	533,599	450,993
Colors, dyes and stains	lb.	2,730,414	2,676,598	102.0	7,701,447	7,227,737
Menthol, natural	lb.	269,226	281,934	95.5	1,658,039	1,373,316
Iodine, crude	lb.	1,231,994	945,985	130.0	1,512,507	1,033,935
Magnesium sulfate	lb.	23,225,993	19,209,618	121.0	260,275	226,691
Potassium perchlorate	lb.	321,871	110,072	292.0	41,617	14,986
Argols	lb.	15,279,027	12,278,796	124.0	967,156	620,536
Dead or creosote oil	gal.	32,133,967	39,536,092	81.3	5,874,259	7,521,384
Cresols, cresylic acid	gal.	2,846,579	1,326,343	214.0	1,276,873	558,705
Calcium cyanamide	s.t.	81,708	84,211	97.2	4,329,464	4,520,953
Calcium nitrate	s.t.	56,362	68,637	82.1	1,816,794	2,551,958
Sodium nitrate	s.t.	607,663	731,530	83.0	21,698,822	26,817,842
Ammonium phosphates	s.t.	234,392	164,133	143.0	15,937,100	11,835,881
Fish scrap	s.t.	9,457	27,809	34.0	1,158,800	3,160,930
Vinyl acetate, unpolymerized	lb.	33,478,271	28,926,303	116.0	5,645,799	4,904,312
Potassium-sodium nitrate, mixtures, crude	s.t.	19,300	8,819	219.0	794,902	399,554
Peat moss, fertilizer grade	s.t.	217,570	220,768	98.4	8,682,528	7,910,959
Carbon tetrachloride	lb.	2,371,280	70,848	3347.0	221,740	13,107
Dextrin from potatoes	lb.	11,206,409	10,954,813	102.0	901,462	891,581
Iron oxide, synthetic	lb.	12,788,845	9,993,529	128.0	850,095	602,847
Barytes ore, crude	l.t.	321,104	283,119	113.0	2,181,119	2,274,834
Whiting—dry, ground	lb.	20,410,756	20,178,535	101.0	158,485	154,071
Acetylene black	lb.	8,097,358	7,715,875	105.0	1,331,023	1,281,546
Benzene	gal.	32,080,257	12,496,533	256.0	7,167,613	3,968,210
Sodium silicofluoride	lb.	4,653,664	4,606,231	101.0	222,716	182,008
Sodium cyanide	lb.	137,186,135	108,727,543	126.0	7,131,778	5,793,643
Sodium sulfate, crude	l.t.	107,853	103,931	104.0	2,412,372	2,062,172
Butylene, other glycols	lb.	2,058,155	904,468	228.0	365,273	233,890
Ethanolamines and other hydroxy alkyl amines	lb.	441,989	1,239,378	35.7	311,480	605,086
Vinyl alcohol, other deriv.	lb.	29,452,713	12,328,203	239.0	6,285,888	2,883,623
Allyl, crotonyl, other olefin alcohols	lb.	633,297	1,468,452	43.1	315,992	380,449
Sulfuric acid	lb.	65,679,486	49,289,745	133.0	553,113	417,707
Pyroxylin	lb.	289,155	517,456	55.7	290,545	534,460
Cobalt oxide	lb.	1,072,950	430,400	249.0	1,791,939	723,368
Coal-tar acids	lb.	358,118	576,023	62.2	422,833	381,659
Phthalic anhydride	lb.	277,780	738,518	37.3	55,557	150,446
Azo and fast-color salts	lb.	118,617	107,644	110.0	215,140	163,532
Fast-color bases, coal tar	lb.	129,013	81,269	159.0	243,585	154,009
Naphthol and derivatives	lb.	180,688	198,224	91.2	606,463	504,158
Medicinal, coal tar	lb.	838,948	504,708	166.0	3,998,894	3,169,793
Phenolic resins	lb.	928,419	227,966	407.0	862,364	236,952
Quinine sulfate	oz.	692,500	790,220	87.7	258,136	305,001
Dextrin and substitutes	lb.	6,675,435	10,067,939	66.3	745,447	988,418
Ethers and esters	lb.	668,976	749,986	89.2	491,488	483,429
Zinc oxide	lb.	6,639,076	4,695,657	141.0	685,186	475,913
Synthetic fertilizer—not elsewhere specified	s.t.	7,285	16,991	42.8	470,034	885,844
Phosphates, crude	s.t.	131,327	136,658	96.2	2,702,955	3,081,430
Potassium sulfate, crude	s.t.	54,527	51,832	105.0	1,981,483	1,883,668

Resurgence from Abroad: Imports Mount

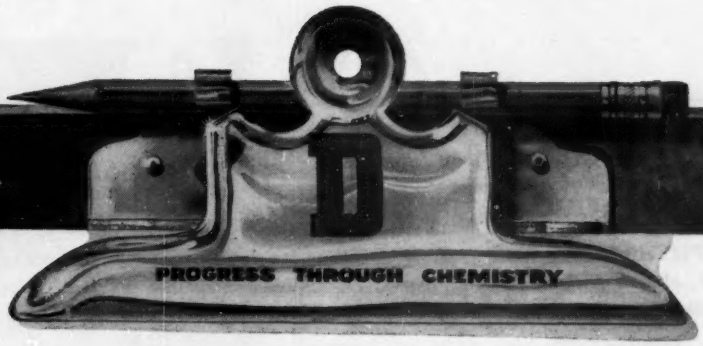
Competition from chemical imports sharpened considerably last year. That's the conclusion to be drawn from a just-completed study soon to be published by the U.S. Dept. of Commerce.

Total chemical imports in '55 were only 2.5% higher than in '54 ($254.8 million vs. $249.3 million). But that total doesn't reveal what really happened.

Explosives imports, for instance, dropped tremendously—to $2.1 million, or 13.3% of '54. Fertilizer imports, too, sagged badly, were only 90.3% of the previous year's $122.1 million. But that's the end of the good news for U.S. sales managers.

Imports of coal-tar chemicals climbed more than 28% over the '54 level, reached a $44,310,000 value. The classification "industrial chemicals" rocketed to $77.3 million, some 32% higher than '54's $58.3 million. Two other categories, pigments, paints and varnishes, and soap and toilet preparations, also scored marked improvements. Medicinal and pharmaceutical preparations remained essentially constant.

Curiously, '55's import pattern reversed that of '54, when there were many more drops than rises from the previous year. Of the 61 chemical materials selected by *CW* for comparison, 30 showed increases (by weight) of 10% or more, 8 had boosts up to 10%. In contrast, only 16 slacked off 10% or more and 7 were down less than 10%.



Announcing

Expanded Rare Earths and Thorium program

of Davison Chemical and Rare Earths, Inc.

Davison Chemical Company, Division of W. R. Grace & Co., and Rare Earths, Inc., Pompton Plains, N. J., a wholly-owned subsidiary of Grace, have joined in a program of expanded production, sales, research and development of thorium, cerium and other rare earths compounds.

Rare Earths, Inc., organized in 1947 for the production of Rareox, an optical quality cerium oxide polishing powder, has diversified into thorium, cerium and other rare earth chemicals. Now, additional facilities are being installed at Davison's Curtis Bay (Baltimore) plant. This means added service plus intensified research and development.

Current applications, in addition to thorium as a potential source of atomic energy, are glass polishing, glass coloring and decolorizing, as a component in carbon arc electrodes, in lighter flints, and for ferrous and non-ferrous metallurgical alloys.

Rare Earths, Inc., an affiliate of Davison Chemical Company, Division of W. R. Grace & Co., offer a quality line of thorium and rare earth chemicals. Contact your Davison Sales Office for additional information on these interesting and useful products.

DAVISON CHEMICAL COMPANY

Division of W. R. Grace & Co.

Baltimore 3, Maryland

Sales Offices: Baltimore, Md.; Chicago, Ill.; Columbus, Ohio; Houston, Texas; New York, N. Y.

Producers of: Catalysts, Inorganic Acids, Superphosphates, Triple Superphosphates, Phosphate Rock, Silica Gels, Silicofluorides. Sole producers of DAVCO® Granulated Fertilizer.

Continued from p. 76

Commodity	Unit	Quantity 1955	Quantity 1954	Percent of 1954	Dollar Value 1955	Dollar Value 1954
Perfumery in alcohol	lb.	230,903	177,383	130.0	2,963,354	2,276,491
Ammonium sulfate	s.t.	173,118	523,828	33.0	7,934,943	14,102,078

NAPHTHALENE: After steadily declining for three years, naphthalene imports bounced back last year, almost doubled '54 shipments. Communist countries accounted for over a third of the 55-million-lb. increase.

Naphthalene (solidifying under 79 C)	lb.					
Canada		2,568,600	.....	....	154,557	.....
Brazil		1,984,140	.....	....	74,742	.....
Sweden		450,489	.....	....	15,249	.....
Denmark		30,291	55,942	54.2	1,374	1,345
United Kingdom		19,491,598	9,851,786	198.0	1,000,509	365,741
Netherlands		13,467,899	5,449,899	247.0	744,285	187,701
Belgium and Luxemburg		25,915,099	16,348,528	158.0	1,407,753	490,438
France		8,760,228	4,128,358	212.0	454,103	120,276
W. Germany		26,285,679	30,165,183	87.3	1,552,576	998,607
Austria		223,480	.....	....	9,372	.....
Czechoslovakia		1,029,731	.....	....	55,115	.....
Poland		17,727,384	871,703	2,030.0	944,989	28,163
U.S.S.R.		3,631,373	.....	....	186,011	.....
Portugal		49,758	.....	....	1,281	.....
Total		121,615,749*	66,871,399*	182.0	6,601,916*	2,192,271*

AMMONIUM NITRATE and MIXTURES: Only Canada was able to better 1954 shipments to the U. S. All other countries show declining volumes. The Netherlands, which sold less than half of its '54 tonnage, slipped the most.

Ammonium nitrate and mixtures	s.t.					
Canada		222,336	218,073	102.0	14,677,769	15,123,040
Netherlands		97,005	197,415	49.1	4,074,969	7,940,387
West Germany		51,155	63,409	80.8	2,335,914	3,062,305
East Germany		2,750	.....	....	117,500	.....
Italy		28,000	36,399	76.9	1,108,802	1,397,151
Total		405,246*	524,938*	77.2	22,314,954*	27,895,245

ACETANILIDES (nonmedicinal): Although total poundage in '55 was off to 93.2% of 1954's, the dollar value rose 52%. West Germany, up sharply, appears to have grabbed much of Britain's loss.

Acetanilides—nonmedicinal	lb.					
Canada		144,970	13,495	1,072.0	74,349	2,205
Sweden		53,007	1,023	5,200.0	6,480	7,801
United Kingdom		335,610	1,071,901	31.2	311,659	367,431
Netherlands		17,743	58,977	30.0	24,881	52,485
Belgium and Luxemburg		21,230	.....	....	13,911	.....
France		33,413	26,138	128.0	64,341	33,051
West Germany		1,474,724	1,136,334	130.0	2,103,269	1,156,398
Switzerland		247,993	207,117	120.0	242,253	259,773
Italy		16,671	276	6,040.0	27,833	3,000
Japan		500	.....	....	6,990	.....
Total		2,345,861*	2,516,003*	93.2	2,875,966*	1,886,030*

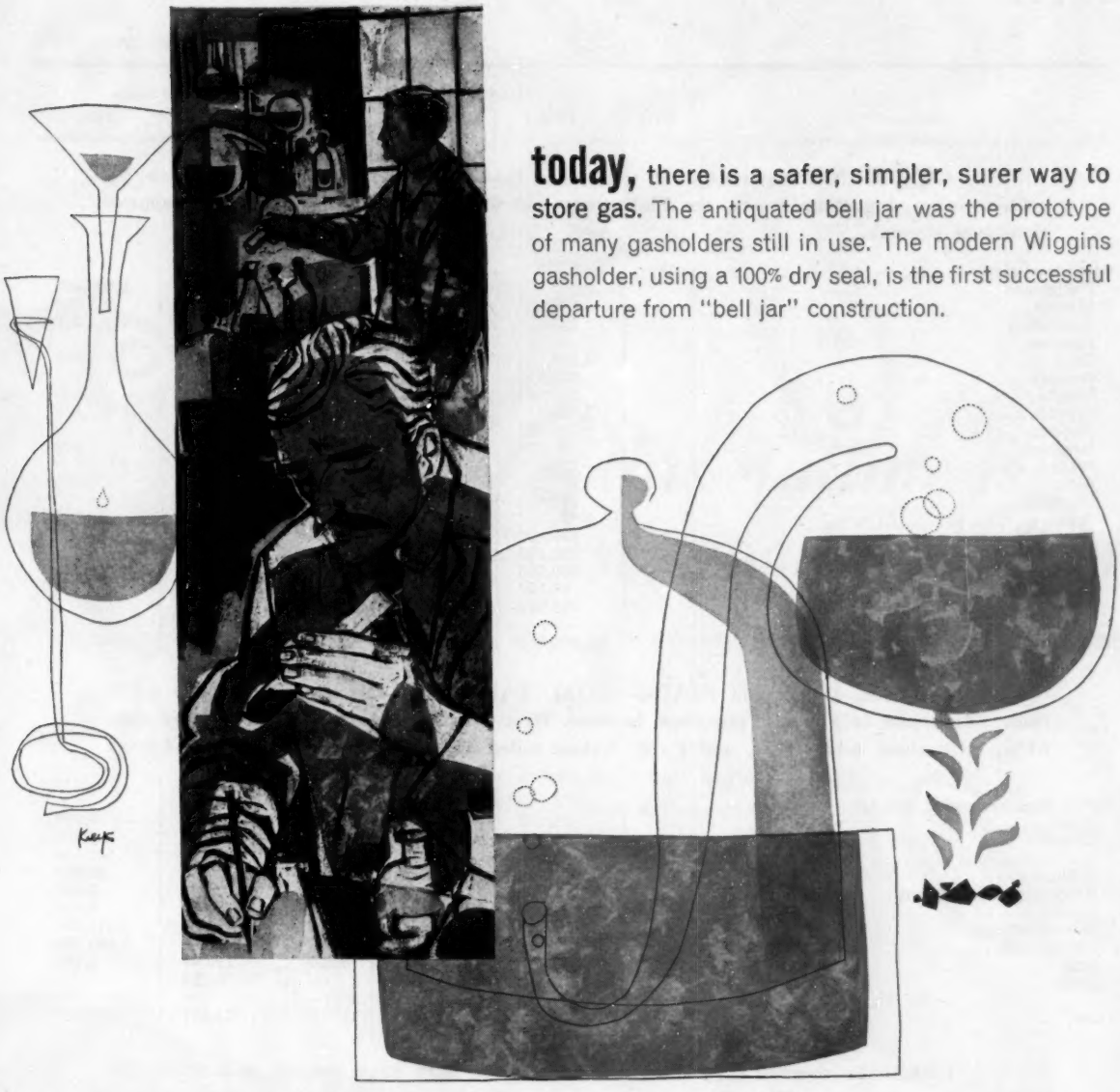
*Totals include figures from countries not listed.

Among the big gainers for '55: ethyl alcohol (up 150%), iodine (up 30%), cresols and cresylic acid (up 114%), potassium-sodium nitrate mixtures (up 119%), carbon tetrachloride (up 3,247%), benzene (up 156%), butylene, ethylene and other glycols (up 128%), vinyl alcohol and derivatives (up 139%), phenolic resins (up 307%), fast-color coal-tar bases (up 59%).

Significant, perhaps, is the upturn in imports from the Soviet Union and its satellites. These countries sent in more than 22 million lbs. of naphthalene in '55, compared with less than 900,000 lbs. in '54. Czechoslovakia boosted its exports of potassium cyanide to the U.S. almost ninefold, accounted for about 6.5% of all imports. And East Germany managed to sell the U.S. $117,500 worth of ammonium nitrate and mixtures.

Holding about even: natural menthol, colors, dyes and stains, calcium cyanamide, peat moss, dextrin (from potatoes), whiting, acetylene black, sodium silicofluoride, sodium sulfate, and potassium sulfate.

Losers: Fertilizer materials appear most prominent in the group showing steep declines. Biggest drop experienced by any chemical was that of ammonium sulfate. In '55, only 173,118 tons valued at $7.9 million cleared Customs; in '54, 523,828 tons, worth $14.1 million, came in. Fish scrap (down 66%) and ammonium nitrate and mixtures (*see box, above*) also plummeted. Not all fertilizer imports declined, however. Urea (*see box, p. 80*) and ammonium phosphates for



today, there is a safer, simpler, surer way to store gas. The antiquated bell jar was the prototype of many gasholders still in use. The modern Wiggins gasholder, using a 100% dry seal, is the first successful departure from "bell jar" construction.

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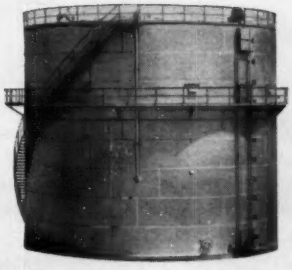

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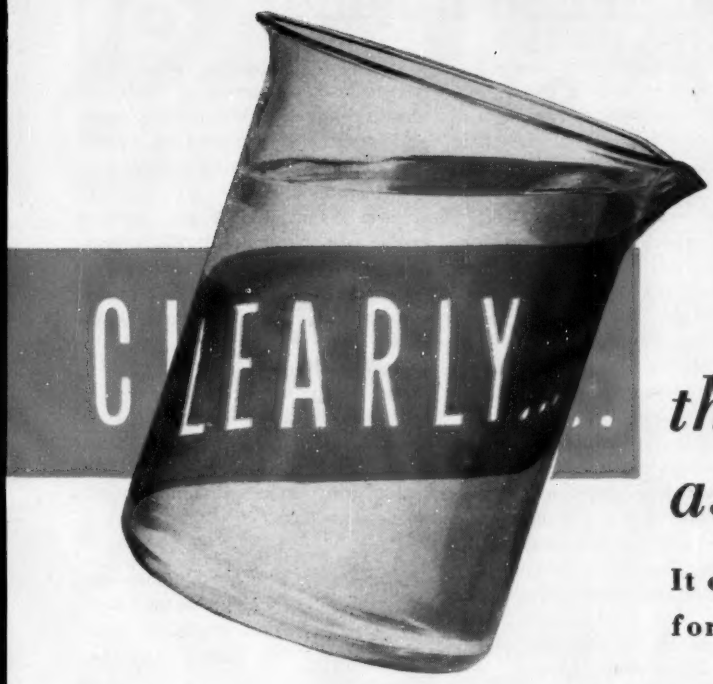
Continued from p. 78

Commodity	Unit	Quantity 1955	Quantity 1954	Percent of 1954	Dollar Value 1955	Dollar Value 1954
GLYCERINE: Imports for '55 were about twice those of '54. Leading the list—as big gainers—were Argentina, Japan, the Philippines and India. Cuba and Nigeria also showed significant strength.						
Glycerine—crude	lb.					
Philippines		8,608,209	6,181,903	139.0	1,402,003	1,105,466
Mexico		1,125,258	1,700,316	66.2	100,303	241,053
Guatemala		221,204	245,431	90.3	39,461	42,808
Panama		24,343	.....	....	4,458	.....
Cuba		3,252,388	2,684,721	121.0	604,885	476,038
Jamaica		621,214	.....	....	114,245	.....
Uruguay		385,805	30,871	1,250.0	76,130	7,445
Argentina		8,894,617	2,355,460	377.0	1,723,564	477,479
Sweden		22,363	.....	....	4,255	.....
Denmark		89,226	44,167	202.0	16,845	8,302
France		129,875	.....	....	24,516	.....
India		3,901,138	2,506,538	156.0	732,767	406,385
Thailand		220,835	.....	....	40,948	.....
Japan		3,984,513	220,439	1,808.0	761,966	30,608
French Morocco		110,401	.....	....	23,834	.....
Egypt		728,070	.....	....	133,737	.....
Nigeria		989,255	448,000	220.0	185,122	88,978
British West Africa		57,197	.....	....	10,185	.....
Belgian Congo		228,397	.....	....	45,433	.....
Total		33,594,310*	16,988,391*	198.0	6,044,657*	3,017,399*
COLORS, DYES and STAINS—COAL TAR: Dollar value in '55 was up 6.5% from '54 despite only a 2% poundage increase. West Germany improved its revenue by some 61%, Switzerland held steady, and U. K. income tailed off severely to 34.6% of its '54 level.						
Colors, dyes and stains, coal tar—	lb.					
Cuba		1,150	1,000	115.0	3,680	3,200
Canada		3,824	700	546.0	20,806	2,681
United Kingdom		129,070	490,848	26.4	196,271	566,444
Netherlands		1,000	15,992	6.25	2,132	28,552
Belgium and Luxemburg		761	1,590	47.8	2,485	3,620
France		1,685	953	177.0	4,183	6,310
West Germany		1,137,843	715,055	159.0	2,347,604	1,451,244
Switzerland		1,442,186	1,445,158	99.9	5,107,875	5,160,204
Italy		8,445	2,441	346.0	10,007	2,202
Japan		4,250	.....	....	5,224	.....
Total		2,730,414*	2,676,598*	102.0	7,701,447*	7,227,737*
UREA: An average price drop of some $3/ton may have helped account for the 8% rise in urea imports. West Germany, doubling its '54 rate, pressed the U. K. (which slipped 16.2%) for leadership. Norway also posted a noteworthy gain.						
Urea	s.t.					
Norway		14,614	11,577	126.0	1,550,363	1,360,610
United Kingdom		30,958	37,015	83.8	2,970,858	3,802,103
Netherlands		792	1,850	42.8	84,289	117,216
Belgium and Luxemburg		714	1,392	51.2	73,577	148,308
West Germany		25,956	10,965	237.0	2,744,847	1,127,013
Switzerland		562	1,899	29.6	57,314	205,746
Italy		5,261	5,597	94.0	501,029	494,020
Japan		68	2,435	2.79	7,862	307,146
Total		78,929*	72,770*	108.0	7,990,539*	7,566,026*

fertilizer recorded fair-size increases.

Off sharply—both in quantity and in value: ethanolamines and other hydroxy alkyl amines, allyl, crotonyl and other olefinic alcohols, pyroxylin, phthalic anhydride, and dextrin and substitutes. Several commodities, such as coal-tar acids and natural menthol, recorded gains in dollar value, although the quantity imported dropped.

How the '55 figures will relate to '56 business is hard to say. But if the upward trend continues, many domestic chemical companies will feel the pinch. And come what may, the imports are almost sure to figure in tariff controversy: for the free-traders, $255 million worth of chemical imports will likely be termed "too small to hurt anyone"; for protectionists, it's a potent argument for higher duties.



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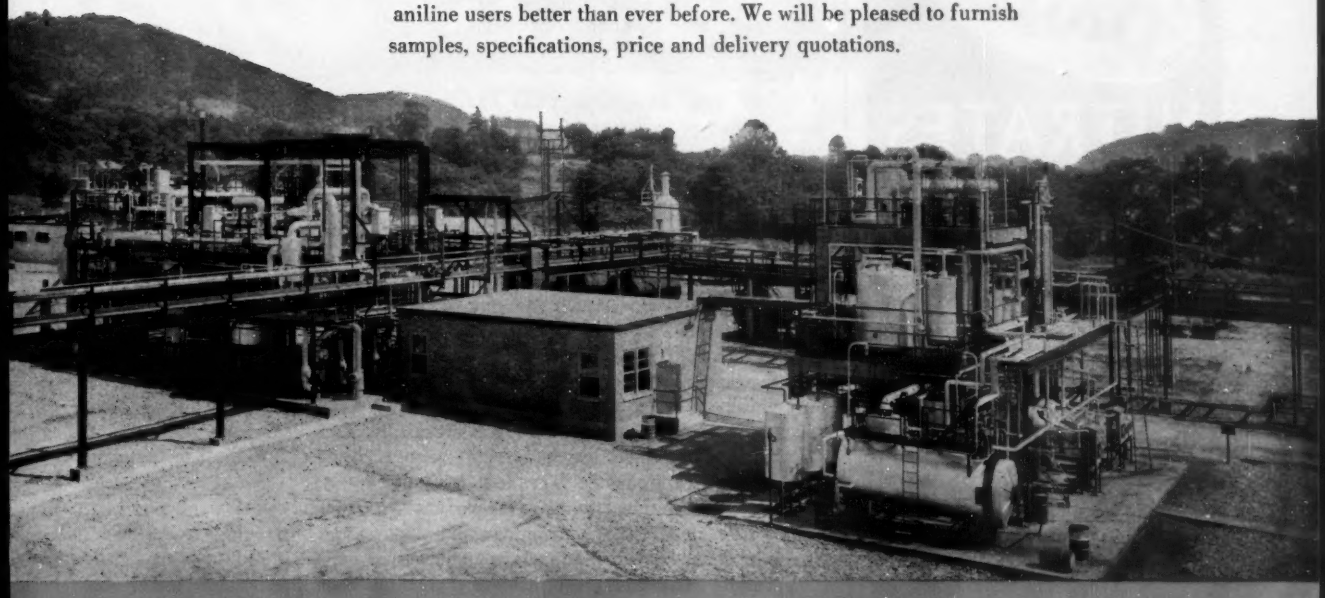

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Streamlined Buying?

Already on paper and slated for a Sept. 1 starting date is a program that should make selling to the armed forces less of a job for industry than it's been in the past. The new approach: a "single-manager system."

Defense Secretary Wilson, after turning down a Hoover Commission recommendation that the Pentagon create a new agency to handle all procurement of "common use" material and equipment, recently outlined this different solution of the problem of unifying military procurement.

Briefly, this is how the "single-manager" program works: One of the three services is assigned all supply functions for a selected commercial-type item. In addition to procurement, this includes standardization, determination of requirements, storage and distribution.

Items covered by Wilson's plan: (1) medical and dental supplies, including drugs; (2) petroleum; (3) clothing and textiles, including synthetic yarns; (4) photographic equipment, including film and photographic chemicals; (5) food.

The Navy has been named single manager for petroleum and medical supplies, the Air Force for photographic equipment, and the Army for food and clothing. The new system, according to the Defense Dept., will "eliminate any possibility of overlapping and duplication in the supply of such items."

In the past, of course, there has been unified procurement for 35 material categories. (For example: the Army Chemical Corps has handled all military buying of about 500 basic chemicals; the Air Force, photographic equipment; the Army, textiles. Also, there have been special interservice organizations, such as the Armed Services Petroleum Purchasing Agency and the Armed Services Medical Procurement Agency.) These agencies, however, were responsible only for purchasing, not for other aspects of supply management, such as setting up of requirements. The individual services shopped for their own needs, often disregarded inventories of similar items held by other services. The result: numerous instances of waste.

Under the single-manager system, petroleum procurement is likely to remain centered in Washington, medical supplies in New York City, textiles in Philadelphia, and photographic supplies in Mobile, Ala.

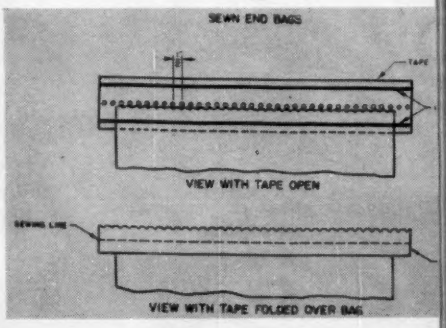
Basic chemicals are not covered by the new system, will still be handled by the Army Chemical Corps.

Benefits of the system, if it works, will be substantial: less waste in the armed services; less red tape for military contractors.

And though total orders for certain items bought by the military may be reduced, most suppliers won't complain. "At last," says one, "we'll be dealing with the services on a sound, businesslike basis."

•

Sling Safety: Bulletin tabulates safe load for slings of 20 sizes of wire rope when used at various angles of application. Macwhyte Co. (Kenosha, Wis.).



Taming the Blow-back

THE MESS caused by powdery chemicals being forced out of a bag by escaping air during filling operations has met a new obstacle—perforated tape. Dubbed Filtovent tape by its maker, St. Regis Paper Co., the strip is used on either or both ends of the bag. Air can escape during both the filling operation and during subsequent handling of the sealed bags. Claimed advantages: reduced blow-back, more accurate weight, less bag breakage, better stacking, reduction in required bag sizes and, in some cases, elimination of perforations under the filling valve.

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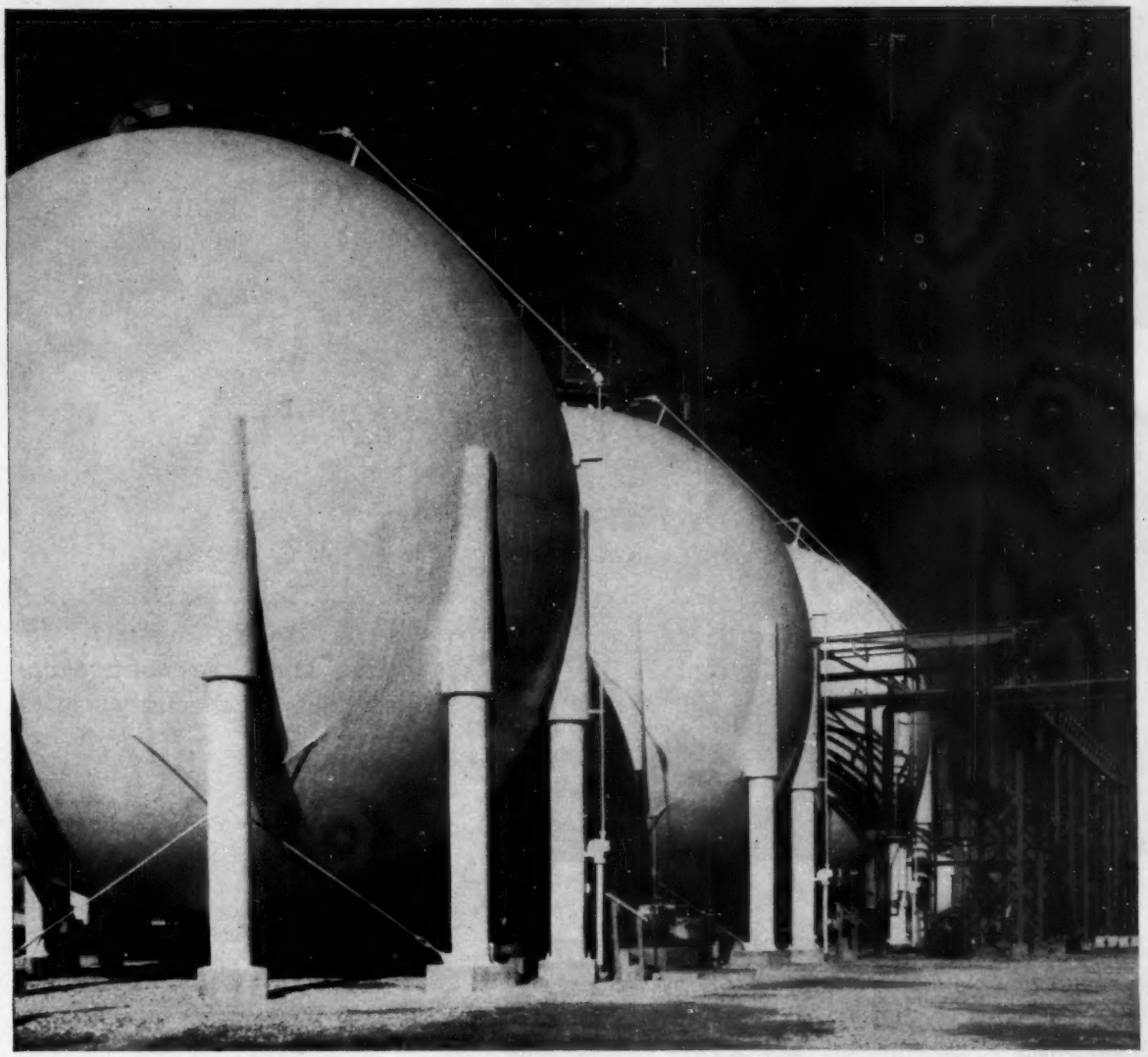

At the Texas producing plant, synthesis gas reacts to form ammonia. This plant operates efficiently and continuously to keep ammonia costs down and assure prompt delivery. In a matter of hours, several days' production can be loaded for shipment.

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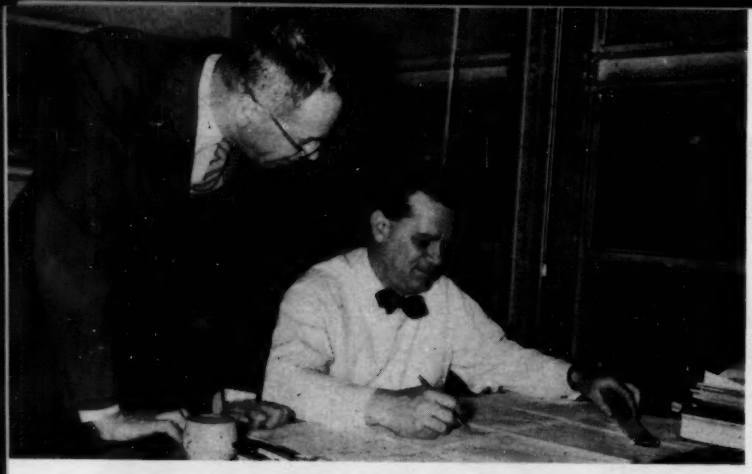


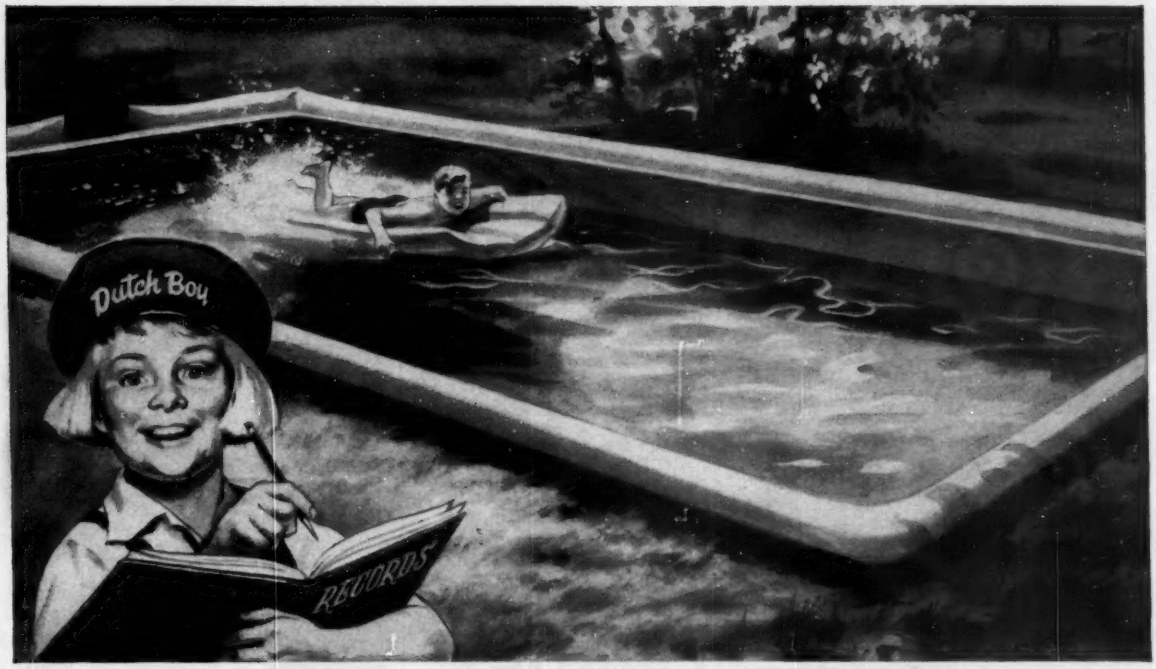
DEPARTMENT HEADS Manson Benedict (left), James Vaughan (right) and Wayne Keller (see below) guided process development.

RESEARCH DIRECTOR and vice-president, Robert Stauffer (left) manages entire scientific staff. Keller (right) is chemistry chief.

TOP MANAGEMENT o.k.'d seeking just-won contract: L. to r.: Richard Morse (president), William Coolidge (chairman), Kenneth Donald (vice-president, treasurer), Stauffer, Gordon Kiddoo (vice-president, commercial development).

Now They're in Zirconium

NATIONAL RESEARCH WILL MAKE $22.7 MILLION WORTH IN FIVE YEARS FOR AEC. Turn page. ►



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One for the Dark Horse

Despite its 10 years in titanium development, National Research Corp. (Cambridge, Mass.) has always been a dark horse as a potential zirconium producer. But last week, the form charts were upset as National's wholly owned subsidiary, NRC Metals Corp., won a whopping $22,750,000 zirconium contract (one of three, *see p. 22***) Atomic Energy Commission.**

The award makes NRC Metals by far the most potentially profitable enterprise sired to date by its prolific parent. What's more, the subsidiary provides the basis for producing thorium, hafnium, high-purity chromium, etc., as demand requires. These metals are already coming in for full-time research.

Meanwhile zirconium will join titanium as an NRC mainstay. Right now, National Research's titanium pilot plant is producing 24 hours/day, 7-days/week. The firm has spent some $6 million on titanium, and further expansion may be in the offing.

Lone Hand: National is going it alone with NRC Metals, hasn't gone outside the company for financing—as it has with its other chemical ventures. National's president, Richard Morse, says that for now the firm has adequate capital. Later, though, he may well be seeking money to build the zirconium plant that's due for completion in 1957. At that time, the firm may deal out a share of the zirconium business.

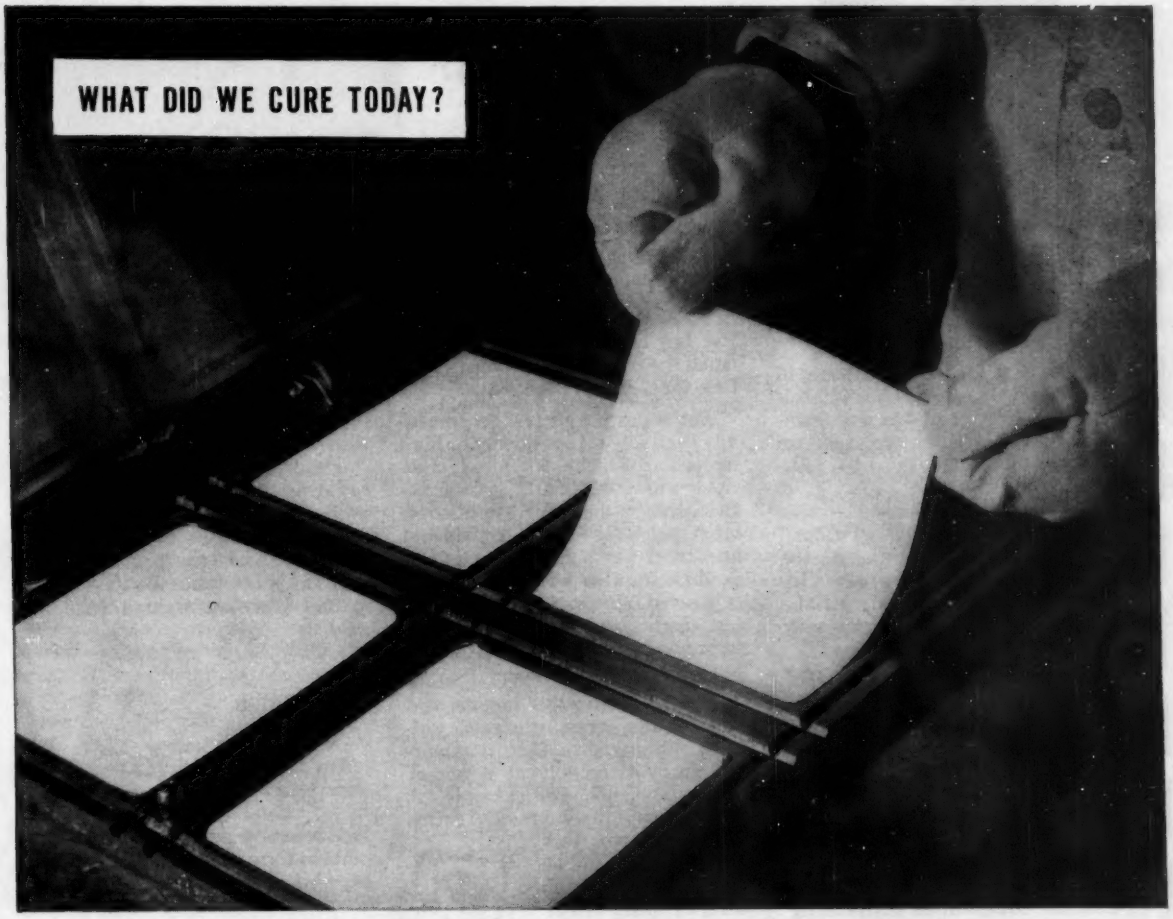
Besides NRC Metals, National Research has figured in the rise of such variegated enterprises as:

• **Escambia Bay Chemical Co.** (Pensacola, Fla.), an ammonia, nitric acid and petrochemicals producer owned by Electric Bond & Share (45%), United Gas (45%), and National Research (10%).

• **Vacuum Metals Corp.** (Syracuse, N.Y.)—special steels and alloys made by vacuum techniques—owned jointly by Crucible Steel and National Research.

• **Fibre Research Corp.** (Cambridge, Mass.)—wool-fiber-grading instruments—owned 40% by National Research and 60% by the Top Co.

• **Minute Maid Corp.** (New York), to which National has profitably licensed a frozen orange juice concentrate process.



Natural Rubber . . . GR-S . . . Buna N . . . Silicones . . . Polyethylene? The above could be any of them or one of many other polymers, when versatile Di-cup is used as the curing agent.

DI-CUP* A NEW "CURE-ALL" FOR POLYMERS?

Coming off a curing press, this slab could be any of a number of materials that can be economically and efficiently cured with new Hercules Di-cup (dicumyl peroxide).

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Di-cup is a stable peroxide of low volatility. Economical to use, Di-cup vulcanizates exhibit good aging, good low temperature performance, and low compression set. White stock is not discolored and good color retention is obtained. Silicones cured with Di-cup are free of gas bubbles and acidic by-products.

Why not learn more about this new curing agent? Write to Hercules for additional data and information on available commercial forms.

Naval Stores Department

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"PERDOX" Chases the Coffee Culprit from Plastic Ware

Increased use of plastic ware in homes and restaurants has intensified the search for an effective cleaner—one that will remove stubborn stains without damage to the plastic surface.

Du Pont has the answer to this problem in the form of "Perdox" sodium borate perhydrate. As the active ingredient in the new dip-type cleaning compounds on the market, "Perdox" makes for easy

removal of coffee and tea stains—the worst offenders on plastic ware. Alkaline compounds containing "Perdox" do not discolor the plastic, affect the surface, or lose their stain-removing ability in the presence of organic matter.

Stain-removers containing "Perdox" have cleaned up trouble for both the kitchen supervisor and the homemaker.

For more information about "Perdox" and its many applications, check the coupon.

Tetrahydrofuran—Intermediate and Powerful Solvent

Best known for its high solvent power, tetrahydrofuran also has large scale uses as a chemical intermediate. A wide variety of reactions indicate the versatility of tetrahydrofuran, for example:

Oxidation ..... succinic acid
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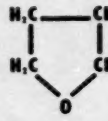
Acylation ..... esters of 1-4 butanediol

In addition, THF is used in extraction and as a solvent medium, particularly for Grignard, sodium acetylide and other reduction reactions. Its ether structure, stability, low boiling point and solvent capacity point to a promising future for THF in both fields.

Tetrahydrofuran has an unusually high solvent action for the high molecular weight polyvinyl chlorides. Now, with THF as the active solvent, these hard-to-dissolve vinyl polymers can be considered and used as "solution resins" to produce improved top-coatings for supported fabrics and plastic sheeting, more durable protective coatings, and stronger films.

A colorless liquid, THF is readily miscible with water, ketones and most of the common organic solvents. Mixing with THF frequently improves the solvent power of weaker solvents. For example, at room temperatures dimethyl formamide dissolves less than 5% of one of the higher molecular weight polyvinyl chlorides and THF about 17%; yet a mixture of 65% THF and 35% DMF will dissolve about 24% of that same polyvinyl chloride to yield a solution of low viscosity. Solvent power can, of course, be increased by raising the temperature, and solutions of PVC in THF show little or no tendency to gel on storage.



Check the coupon for more information about this powerful solvent—its uses, applications and properties.

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Microscopic particles of sodium dispersed in an inert medium offer definite advantages over bulk sodium in many reactions. Yields are better, reactions faster—frequently at lower temperatures.

Sodium dispersions were first developed by Du Pont* and are particularly useful in systems where sodium is insoluble. In such cases, reaction time is a function of the sur-

face area of the sodium, and in dispersion form, the total surface area exposed is extremely large. Finely divided sodium dispersed in various media gives excellent reaction rates and yields in sodium-organic reactions, and makes possible many reactions which cannot be carried out with the solid or molten metal.

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- ☐ Sodium
- ☐ "Perdox" sodium borate perhydrate
- ☐ Tetrahydrofuran
- ☐ Formaldehyde
- ☐ "Elvacet" polyvinyl acetate

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"Elvacet" polyvinyl acetate coatings—either clear or pigmented—on paper, cloth, wall and floor coverings are easily applied and air dried. Coatings adhere well . . . are stable to light and oxidation . . . are asphalt-resistant, and are not affected by aliphatic hydrocarbons, vegetable oils or animal fats.

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• **Leybold - Hochvakuum - Anlagen,** G.m.b.H. (Köln, West Germany), 24% owned by National Research.

These diverse interests reflect the company's pattern of using research to sire whole new enterprises. National conducts both fundamental and applied research principally in chemistry, metallurgy, physics and dehydration. It works either alone or with another company, aims at acquiring an equity in the results. The firm's vice-president of commercial development, Gordon Kiddoo, puts it this way: "Basically, we're trying to spend our money where we can keep an interest."*

The Formula: The company's success with zirconium illustrates its approach to a new venture. All ideas must be in a field in which the company has some background. Because the company is strong in metallurgy, zirconium passed this qualification.

New ideas can originate anywhere in the organization, are channeled upward to the department director. And if one looks worthy of consideration, it is passed along to director of research Robert Stauffer.

He and commercial development director Gordon Kiddoo look at it from both technical and commercial angles. Other department heads are called in to discuss the project's scientific feasibility.

Zirconium qualified because many of the firm's titanium processes could be applied to zirconium production. Commercially, it filled the bill because there appears to be a big market for zirconium in civilian uses (e.g., as a construction material).

Top management, which meets once a week, comes into the picture at this stage. Zirconium production appealed to them for two reasons: it has all the earmarks of a potentially profitable enterprise; many other money-making products could accrue from the research.

Top management's approval signals the go-ahead for intensive research. In zirconium's case, researchers Wayne Keller, Frank Benner and Manson Benedict attacked the chemistry problems; James Vaughan, process engineering head, was responsible for the process and plant design.

The result is a process that reportedly will permit zirconium costs to be halved (from $12 to $6.50/lb.).

A number of factors are typical of the way National Research moves on a problem.

• Research is divorced from production to avoid spending research time on production problems (e.g., quality control, everyday crises). Research efforts are concentrated on long-range research projects. That's one reason why the zirconium plant won't be built in Cambridge, although the research department will remain there.

• The firm is highly selective in choosing projects. It doesn't believe in scattering its shots in the hope that a few will pan out. Once the go-ahead is given, however, research pushes hard.

• It couples technical research with intensive market research. This is Kiddoo's job. He looks at projects from both the technical and commercial standpoint, has a strong voice in determining the direction in which to head research.

• It displays a "we're-in-research-to-make-money" attitude. Not only are salaries pegged favorably with top research rates, but the firm has a number of other incentives: (1) stock

*Although National Research does about 20% of its research on outside contracts.

HOW NATIONAL RESEARCH OPERATES

A research company's corporate formula.

1. Keep research divorced from production.
2. Be highly selective in choosing projects.
3. Instill a "we're-in-research-to-make-money" attitude among researchers.
4. Back scientific research with intensive market research.
5. Be on the lookout for sound European research ideas.

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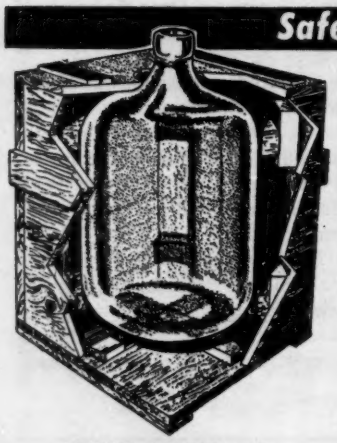

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options are granted to key technical people, as well as management, (2) researchers get bonuses for patents granted, (3) men are given the opportunity to move into managerial positions in subsidiaries,* (4) good researchers are not burdened with non-creative jobs. They're given a minimum amount of paper work.

Lack of sound market research resulted in a couple of costly errors back in 1948. On the basis of a superficial market survey, the firm developed techniques for high-vacuum fractional distillation of heat-sensitive materials (e.g., vitamins). But no market for the equipment developed, and the company wryly admits, "Maybe our surveys weren't as penetrating then as they are now."

Another reversal occurred after the firm's success with frozen orange juice. It developed frozen apple juice, found no takers, gave the project up.

• Use of European ideas gleaned through its interest in the German vacuum equipment manufacturer, Leybold-Hochvakuum-Anlagen, has also helped. New ideas in chemical and metallurgical research are swapped between the two firms' research staffs. National Research finds, as others have found, that there's a lot of valuable information in European research minds.

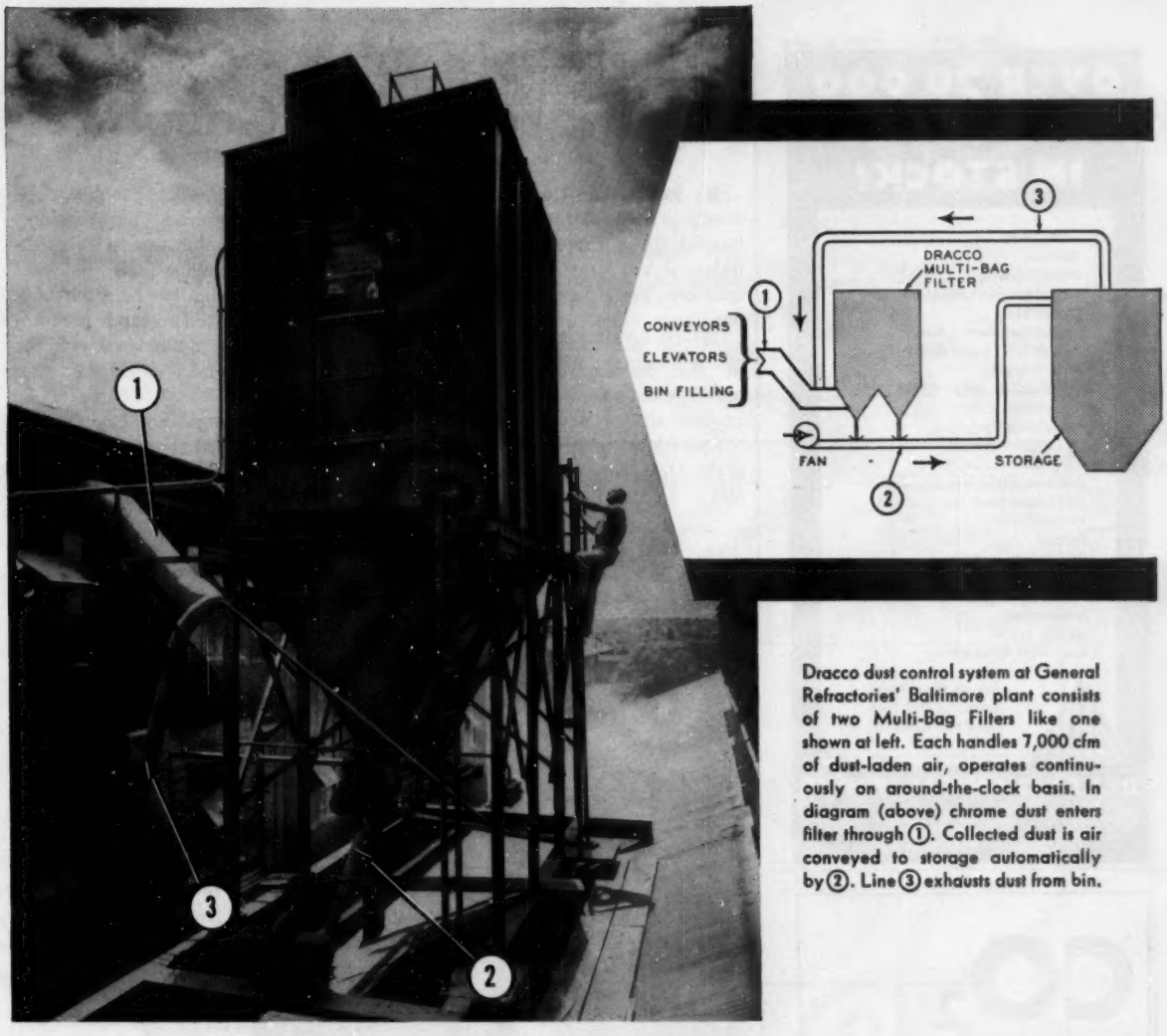
• Research thinking is represented at the board-of-directors level by Vice-President and Director of Research Robert Stauffer.

• Geographical location of its research center. National Research feels that New England is a good place in which to do research. It's able to use the universities' libraries, maintain contact with many top scientists.

Thanks to the AEC zirconium contract, National Research's annual income will probably double its 1955 mark of $4.2 million. And because of expected operating economies of the new plant (thanks largely to a new process, nearness to raw materials), an even heftier boost to earnings is anticipated for '57.

These are the goals the company is setting for its future research progeny. If history is any criterion—and National Research is confident that it is—you'll be hearing more from this highly research-minded, highly dollar-conscious, firm.

*Nat Robertson, for example, was formerly director of National Research's Petrochemical Dept. Now he's director of research for Escambia Bay Chemical Co.



Dracco dust control system at General Refractories' Baltimore plant consists of two Multi-Bag Filters like one shown at left. Each handles 7,000 cfm of dust-laden air, operates continuously on around-the-clock basis. In diagram (above) chrome dust enters filter through ①. Collected dust is air conveyed to storage automatically by ②. Line ③ exhausts dust from bin.

How to Solve a Dust Problem - *Completely*

When you try to expand the production facilities of the world's largest basic refractories plant (General Refractories Company at Baltimore), you are faced with a serious problem. This is the escape of chrome dust from materials handling and bin filling operations. What would you do?

General Refractories and Dracco engineers coordinated their abilities to provide an outstanding Dracco dust control installation which is the complete and final answer to this annoying and costly problem.

Chrome dust is now trapped at its source before it can spread, moved through an enclosed system and collected in two peak-efficiency Multi-Bag Filters. This produces better plant efficiency, improved working conditions with reduced health hazards, no threat of costly abrasive wear of machinery, and minimum housekeeping costs.

An added cost-saving feature of the Dracco system is that all recovered dust is returned directly to process bins by fan-type Airstream Conveyors for reuse. By eliminating manual handling, savings in labor costs are realized. Because of the success of this operation, Airstream Conveyors have been added to two dust filters previously installed to move dust back to process.

If you want to solve your dust problem completely, follow General Refractories' example—call in Dracco. You'll be glad you did.

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β-(1-Acenaphthoyl)-propionic Acid;
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RESEARCH

Nitroparaffins in Gasoline?

It's hard to find anyone who will firmly predict that nitroparaffins are headed for a career as gasoline additives. Yet research in several quarters would seem to belie this pessimism. This work strongly suggests that the current shortcomings* of the horsepower-boosting nitroparaffins may be no problem in new engines and/or new gasoline blends.

One center of research in this field is the University of California (Berkeley) where Ernest Starkman, associate professor of mechanical engineering, is probing nitroparaffins, primarily in conjunction with methanol, as piston engine fuels.

So far, Starkman has been pursuing a highly specialized research program covering rather limited use of the nitroparaffins under highly specific conditions.

Sample finding: an engine that produced 100 hp. at the flywheel on gasoline produced 150 hp. on 45% (by weight) nitromethane in alcohol. (by weight) nitromethane in methanol. the gasoline run had to be upped to 0.4 for the nitromethane-alcohol trial.

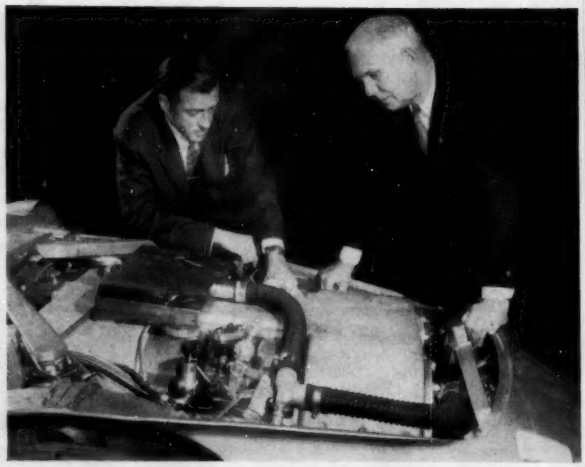
Starkman points out that this in-

*In today's auto engines, they promote preignition, knock and corrosion (through liberation of nitric acid). Too, they're relatively costly, not very soluble in standard gasoline blends.

'Quite possible,' declares fuel-researcher Ernest Starkman.

U. of Calif. associate professor of mechanical engineering, he is seeking fuel blends that permit utilization of nitroparaffins' power-boosting ability.

It depends largely on the engine designers.



Taking shape on drawing boards are drastically new designs that could shatter traditional fuel concepts. Case in point: GM's free-piston engine (right), which burns animal, vegetable or mineral oils.

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- ☐ *Research*
- ☐ *Return to Purchasing*

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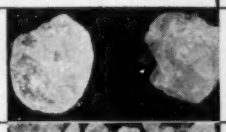
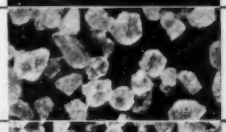
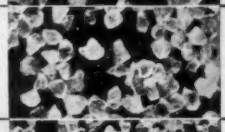
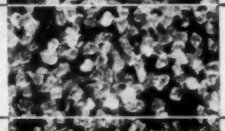
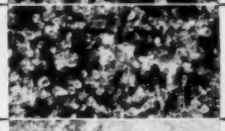
PEA No. 1 Repackage these big sparkling PARADI crystals just as they come from the drum. 				
PEA No. 2 A popular size for repackaging in vaporizer cans. 				
RICE No. 1 Smallest crystals recommended for direct repackaging. Excellent for shaker-top cans. 				
RICE No. 2 Exceptionally free-flowing, easy packing, for fast refilling of power presses. 				
RICE No. 3 For foot-operated presses you need a finer crystal like this—free-flowing but small enough to pack and compress easily. 				
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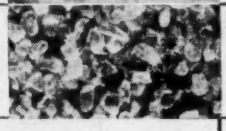
GRANULATED Sell this size in bulk for agricultural use. 				
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crease in horsepower occurs even though nitromethane contains only 5,000 Btu./lb., and methanol, 10,000; gasoline has 20,000. The explanation of this anomaly is that both higher combustion efficiency and higher fuel consumption per available horsepower occur when nitromethane is used.

Worse for Knock: Starkman found that addition of nitromethane significantly lowered the octane rating of neo-gasoline (a blend of benzene and iso-octane). This increased tendency to knock highlights a situation that is handicapping research: all the engines used in Starkman's investigations, as well as in most other research of this kind, are designed for conventional fuels (either standard hydrocarbons or fuels such as methanol). An engine designed with nitroparaffins' advantages and limitations in mind might show greatly reduced tendency to knock on the nitroparaffin-neo-gasoline fuel.

Starkman is still trying to find out why and how the nitroparaffins contribute their punch to fuels, under what conditions they work best, and what type of engine is necessary for maximum efficiency. But he already has some ideas on how they might be used.

Since nitroparaffins are relatively insoluble in present low-aromatic gasolines, it appears unlikely that any use will develop for them as additives or blending components in today's gasolines. But the solubility in gasoline is increased by using higher-molecular-weight nitroparaffins, as well as more aromatic gasolines. And solubilizers are available for blending. So there is some possibility that higher nitroparaffins (possibly dinitropropane) might find a place in an entirely new type of gasoline.

Meanwhile, four possible applications for nitroparaffins, in general, and nitromethane, in particular, are shaping up:

(1) as a specialized fuel for piston engines wherein a large amount of power is required from relatively small volumes of fuel (as in model airplane engines and racing cars).

(2) in diesel engines.

(3) in gas turbine engines.

(4) as a monopropellent in rockets.

Underscoring the first application, nitromethane producer Commercial Solvents Corp. (New York) is moving

to satisfy a growing demand for the compound in drag racing*. The company is launching a test-marketing program for the packaged product this spring.

Oil companies, most of which have looked at nitroparaffin additives at one time or another, have mixed opinions as to their future in fuels. Those no longer researching them concede the compounds may have highly specialized piston engine uses, but in them see little reason to design a new series of engines and revamp piston fuel production—at least in the foreseeable future. And while nitromethane can be used in diesels, it's generally considered too expensive (about $1.50/gal.) for this purpose at present.

Gas turbines, rockets and possibly jets probably offer the biggest potential for nitroparaffins.

Commercial Solvents, which is engaged in an intensive nitroparaffin development program, is probing nitromethane as a monopropellent for jet propulsion (the nitromethane molecule contains about the right amount of oxygen for complete combustion, makes a separate oxygen source unnecessary), also sees it as a promising explosive, selective solvent, and spinning solvent for polynitrile-type synthetic fibers.

Nitromethane's potential as an explosive stems from the same properties that make it a promising monopropellent. Its explosive nature, however, has discouraged efforts to develop large-scale industrial applications in other fields.

To compensate for this, considerable work under way is aimed at harnessing the chemical's volatile nature for gainful labor.

In security-shrouded studies with the Bureau of Mines, Commercial Solvents is developing a nitromethane explosive—also delineating the conditions needed to avoid explosions. Result of the firm's work might well be a product that would be mixed with sensitizers at point of use.

But the company is understandably reluctant to dismiss nitromethane's auto fuel potential, thinks further investigation (e.g., of effect of small proportions of nitroparaffins in conventional fuels) is clearly called for.

*Drag racers develop speeds up to 130 mph. from a standing start, mix their own nitroparaffin-alcohol fuel.

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RESEARCH . . . . . .

PRODUCTS

This week saw the debut of a crop of new reagents:

• Now available from Schwartz Laboratories, Inc. (Mount Vernon, N.Y.) are three new cyclic nucleotides: adenosine 2′:3′-cyclic phosphate, cytidine 2′:3′-cyclic phosphate, uridine 2′:3′-cyclic phosphate (all as the barium salts). The trio are useful in studies of nucleic acid structure, serve as starting materials for synthesis of the corresponding nucleotide diphosphates and branched nucleotide phosphate esters.

• From Borden Chemical Division's Dajac Laboratory (Leominster, Mass.) come L-leucyl-β-naphthylamide hydrochloride (for use in the colorimetric determination of leucine aminopeptidase activity) and 2-(*p*-iodophenyl) - 3 - (*p*-nitrophenyl) - 5 - phenyltetrazolium chloride (for staining tissue sections).

• Three additions to Eastman Kodak Co.'s (Rochester, N.Y.) line of organic chemicals include: (ethylenedinitrilo)tetra-acetic acid dipotassium salt (more soluble in alcohol than the corresponding sodium salt); N, N-diethyl-*p*-phenylenediamine oxalate, a reagent for determining free chlorine and chloramines in water; and 3-(*p*-nitrophenyl)-1-(*p*-phenylazophenyl) triazene, a spot-test reagent that forms colored lakes with divalent magnesium and cadmium ions.

•

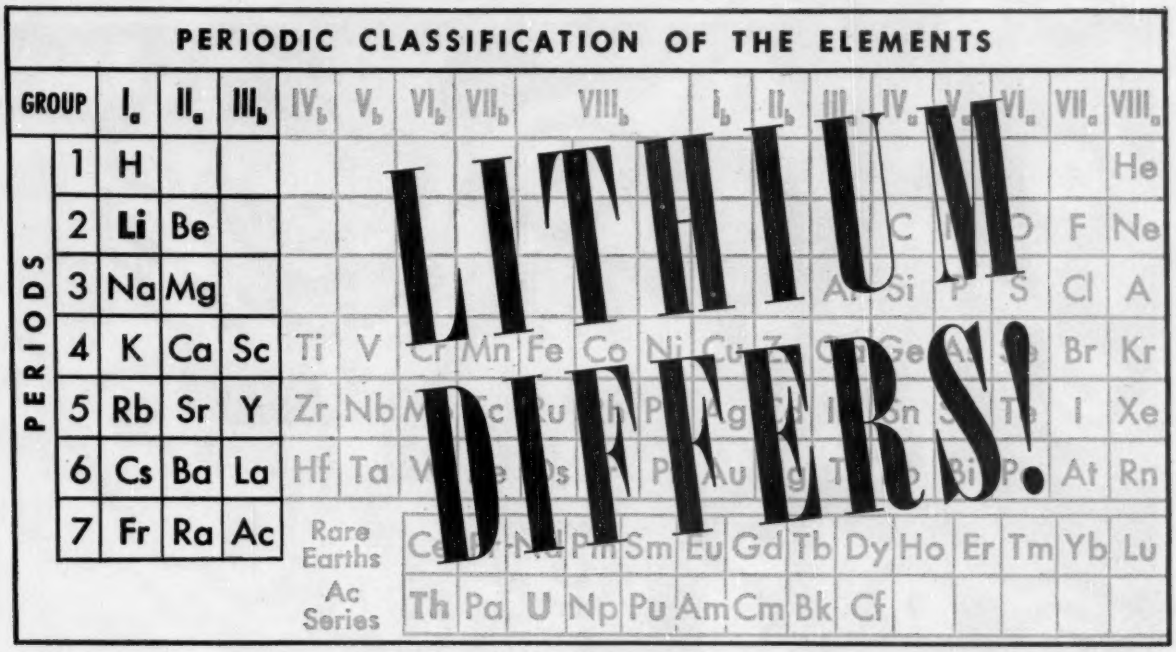
Tallow Nonionics: A series of new low-cost nonionic detergents based on tallow alcohol are offered by American Alcolac Corp. (Baltimore). They're polyoxyethylene alcohols designated Siponic E-1 through E-5. Evaluation as pigment dispersing agents, components of textile auxiliaries, ingredients in low-foaming and heavy-duty household detergents is under way.

•

Pine Products: Two pine-gum chemicals developed by the U.S. Dept. of Agriculture (Olustee, Fla.) are now commercially available:

Maleopimaric acid, used by the photographic industry in paper coatings and printing inks, is made by Distillation Products Division (Rochester, N.Y.) of Eastman Kodak.

Pinane hydroperoxide, a catalyst for cold-rubber production, is available in experimental quantities from American Cyanamid.



Lithium, by reason of its atomic configuration and general characteristics, is rightfully included as the first member of Group I in the Periodic Table. A detailed study of the properties and reactions of both the elements and their compounds, however, shows that Lithium often resembles the metals of Groups II and III more closely than Group I. Following are some characteristic differences:

Lithium differs in organic chemistry . . .

because its organolithium compounds form a unique class with stability, solubility and activity characteristics intermediate between those of the Group I and Group II organometallic compounds.

Lithium also differs from the other alkali metals in that it serves as a unique catalyst for the polymerization of diolefins to materials of definite and predictable structure. It directs, for example, the polymerization of isoprene predominantly to 1,4 addition structures.

Again, recent investigations have indicated an interesting potential as a direct reducing agent in solvents such as ammonia, low molecular weight amines, and ethylenediamine.

Lithium differs in metallurgy...

inasmuch as the affinity of Lithium for oxygen, for example, is being utilized to reduce porosity in copper and copper alloy castings. Recent research has revealed that Lithium will produce brazing alloys with self-fluxing properties and increase the wetting ability of these alloys.

Lithium differs in inorganic chemistry . . .

the usefulness of Lithium Hydride and Lithium Aluminum Hydride in the preparation of other hydrides having already been widely demonstrated. Recent studies indicate that other complex hydrides prepared in a similar manner may prove to be interesting tools for research. The low dissociation pressure of Lithium Hydride at its melting point, to cite a specific example, is unique among all hydrides. LiH also has some slight solubility in polar organic compounds which is again unique among alkali metals.

Lithium differs in heat transfer . . .

based on its physical properties it has no equal as a liquid metal coolant. Due to corrosion caused at elevated temperatures by impurities in commercially available Lithium and Lithium Metal, Lithium has thus far found only experimental use.

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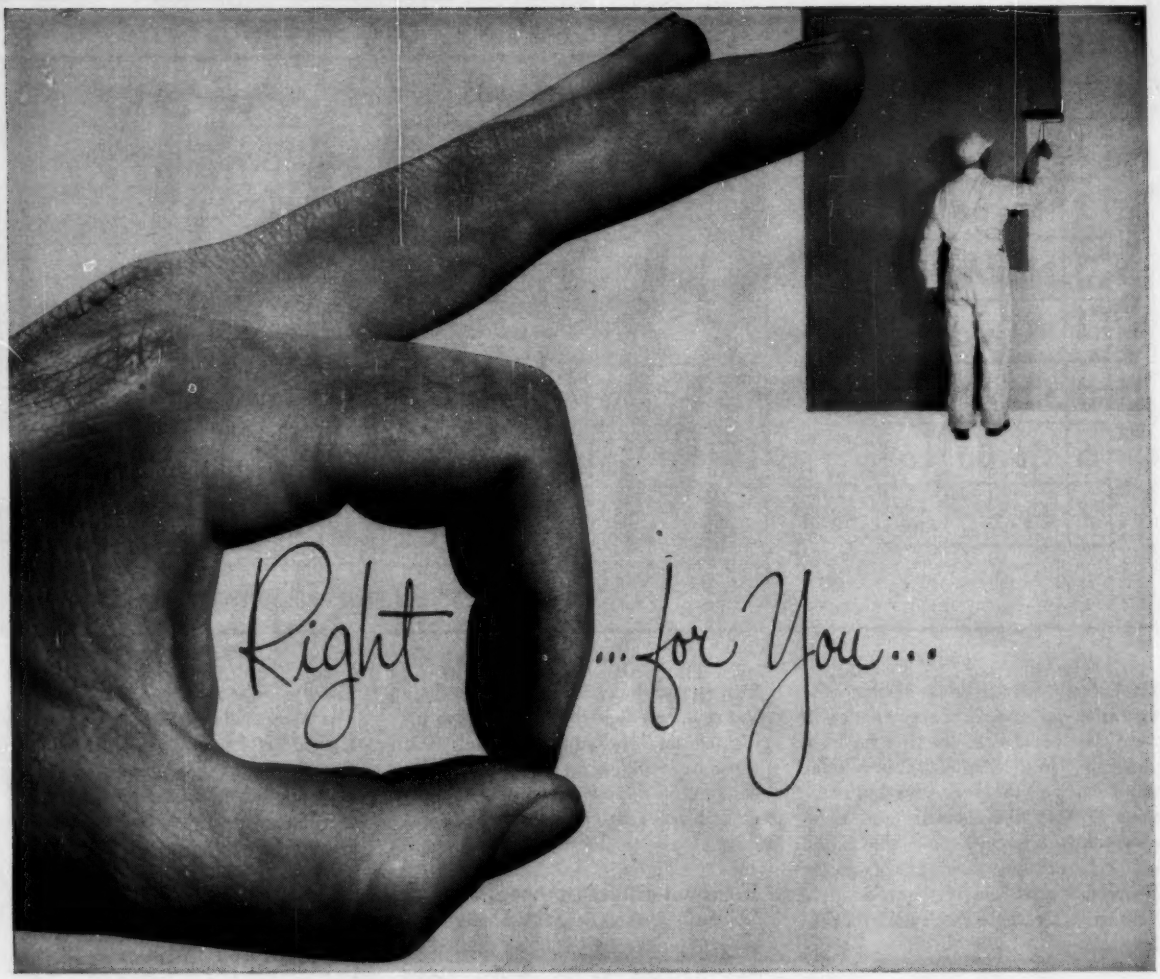

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Market Newsletter

CHEMICAL WEEK
May 12, 1956

There'll be no snap-back on rubber prices now that Goodrich-Gulf has brought the tabs on its GR-S synthetic into line with those of another producer, Phillips Petroleum. Others in the business haven't commented yet, but chances are they will—soon.

The new prices: up 0.9¢/lb. to 25¢/lb., delivered; 23.9¢/lb., f.o.b.

Coincidentally, trends in synthetic rubber production were sketched out by President William S. Richardson, of B. F. Goodrich.

Increasing availability of synthetic rubber and continuing high prices of crude natural rubber, observed Richardson, have shifted tonnage leadership to the man-made products; crude rubber reached a high of 52¢/lb. about 16 months ago when principal grades of synthetics were selling for 23¢/lb.

And the gap between use of natural and synthetic rubber will probably continue to widen. One indication: Goodrich spent $75 million in the past two years, now earmarks $200 million more for a capital expenditure and investment program for the 1956-60 period. These plans are being justified by the stated belief that "families with incomes of over $5,000/year will provide the expanding market that will help absorb the increasing stream of new products."

Without chemical rubber production, added Richardson, the world would be short about 1.15 million long tons of rubber this year; such a shortage would bring back tire, gasoline and automobile rationing.

Speaking of tires, what effect will the higher rubber prices have on passenger car and truck tire costs? The word (unexplained) from Goodrich: no immediate changes despite diminishing retail stocks.

•

But not all prices are going up. Biggest reductions this week—as much as 16¢/lb.—will benefit users of Carbide and Carbon's Cellosize hydroxyethyl cellulose protective colloid and thickener.

New per-pound prices on the WP-09, WP-3, WP-40 and WP-300 grades: 20,000 lbs. or more, $1; 2,000 lbs. or more, $1.05; 125 lbs. or more, $1.07; less than 125 lbs., $1.17.

Also going down is adipic acid. New labels posted by Du Pont are reduced by 3¢ to 32¢/lb.

Compared with '54, adipic acid consumption last year, for uses other than as an intermediate for the manufacture of nylon, increased more than 50%. It's now going into adipate plasticizers and polyesters for the production of polyurethane foams, and into reinforced plastics, wire coating enamels, solid propulsion-type fuels.

And reflecting the adipic acid price cut are lower tags on several adipic-derived plasticizers. New prices—down 2½¢/lb.—for dioctyl adipate, diisoctyl adipate, diisodecyl adipate: 40¢/lb., tank cars; 42¢/lb., carlots; 43¢/lb., l.c.l.

Copper producers are worried—and for good reason. Spokesmen for the industry are increasingly articulate in expressing fears that copper is in for a tough fight to keep its markets intact.

The huge demand for copper both here and abroad, plus chronic shortages, are sending prices upward to a point where even major changes in production methods no longer deter switches to aluminum; and meanwhile, the search for substitute materials—viz., plastics, steel, aluminum—is proceeding at a rapidly increasing pace.

What's to be done? Main objective of the industry, say some producers, is to increase copper supplies through discovery of new ore bodies, stepped-up production; the resulting lower prices, it's hoped, would then slow down the search for substitute materials.

•

Slashed ammonium sulfate prices this week focus attention on the industry's surplus problems. Early this year, overstocked ammonium sulfate sellers were looking for a pickup in domestic demand (*CW Market Newsletter, Feb. 11*), but the current general slump in farm chemical use has, instead, aggravated an already troublesome surfeit.

How critical the situation is can be deduced from U. S. Steel's drastic ($10-13) cut of coke-oven ammonium sulfate prices to $32/ton, east of the Rockies.

So far, there's no news about repercussions in the market for synthetic ammonium sulfate, but some observers look for curtailment of production, if not price changes.

•

Titanium tetrachloride is now flowing from Columbia-Southern's new plant in Natrium, W. Va. The outdoor installation will produce 35,000 tons of tetrachloride annually when operating at full capacity.

•

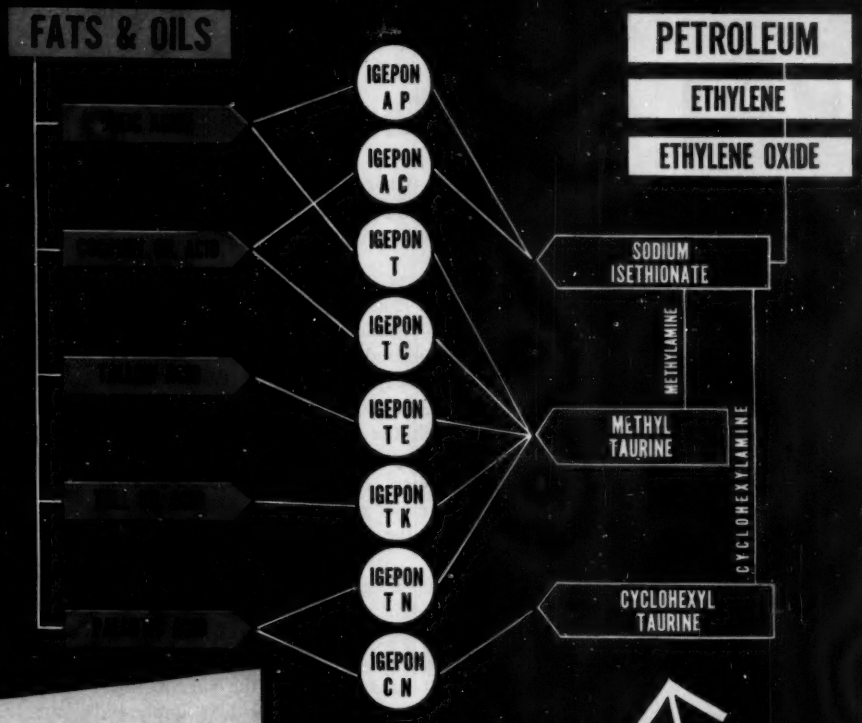
Also onstream: a new unit that will produce resins used to make wet-strength papers. Hercules Powder's plant at Portland, Ore., will turn out Kymene resins for fabricators of paper toweling, bags, blueprint paper, container and separator boards, and other specialties.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending May 7, 1956

DOWN

	Change	New Price
Adipic acid, bgs., c.l., dlvd.	$0.03	$0.32
Dioctyl adipate, tks., wks.	0.025	0.40
Diisooctyl adipate, tks., wks.	0.025	0.40
Diisodecyl adipate, tks., wks.	0.025	0.40
Melamine, bgs., carlots, wks.	0.03	0.30

All prices per pound unless quantity is stated.



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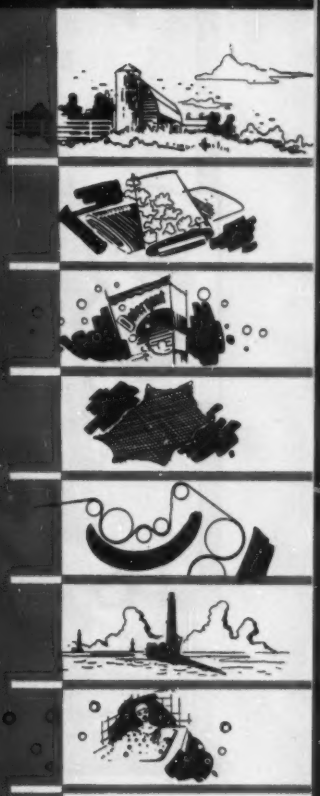

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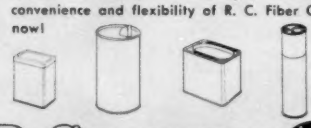

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Easing for Exporters

Will Soviet bloc markets for American goods, including chemicals, expand? It's a moot question. But the U.S. is relaxing restrictions on some 700 nonstrategic items.

YOU may not agree with the principle, but the fact is that American markets — chemical and otherwise—do extend beyond the Iron Curtain. And this week exporters are studying a new Dept. of Commerce ruling that will smooth the way for a greater volume of exports to the Soviet Union and her European satellites. It's the first major easing of trade restrictions since the beginning of the "cold war."

Commerce has set up a new roster of 700 items (including chemical specialties, drugs and pharmaceuticals, paper products, pigments, paints, dyes, rubber products, soil improvement compounds) that exporters may now ship to the Soviet area without obtaining an export license for each shipment. Strategic chemicals, however, still require a validated license (*CW, March 17, p. 26*).

Commerce Secretary Sinclair Weeks emphasized that all goods on the list were of the type that would be approved for export under existing licensing policy. The new general license procedure, he added, in no way reflects a change in the policy of banning shipment of strategic goods to the Soviet bloc, nor a relaxation of the strict embargo on all trade with Red China, North Korea and other proscribed areas throughout the Far East.

Months ago, Weeks announced that his department would issue a list of goods that could be shipped freely to the Soviet bloc in Europe; but difficulties in compiling a satisfactory list delayed issuance from January, when it was expected, until now.

Exporters have been prodding the department since early this year for just such action. Strong—and growing —interest in trade with Russia and the European satellites is evident in the large volume of applications for export licenses filed with Commerce during the first quarter of '56. Licenses granted in the first three months covered material valued at $8,788,000, some $1.5 million more than was shipped during all of 1955. In 1954, shipments amounted to about $6.1 million; in '53, the total was slightly less than $1.8 million.

The switch to general license will, according to Weeks, reduce the paperwork burden on American exporters and the government, as well as facilitate an increase in peaceful commerce. Under the simplified procedure the exporter will not have to deal with the Commerce Dept., but will identify his goods by marking "GLSA" (General License Soviet Area) on the manifest and package. Customs officers will permit shipment if the item is on the GLSA list. In effect, the new ruling simply adds items to the GLSA list that previously could be shipped to the Soviet area only with a validated license obtained on application to Commerce by the exporter.

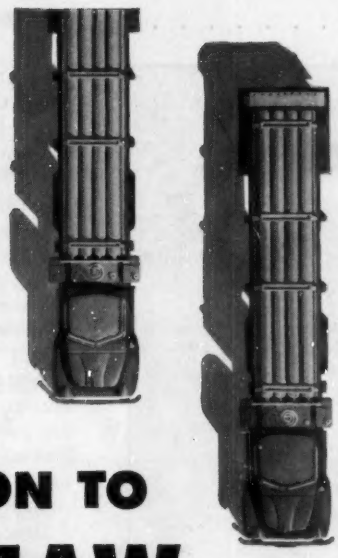
There is some grumbling among many foreign traders that the new list is not as complete as had been expected. But Commerce officials say that the roster is subject to constant revision; items may be added or subtracted as trade developments indicate.

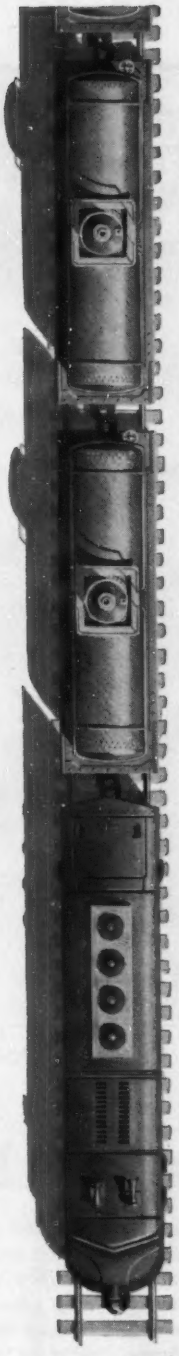
What Effect? Will the easing in rules actually step up marketing of American material in the Russian dominated areas?

Reactions of many exporters are mixed. Some doubt that the new policy will lead to any lasting increase in business, claim the previous special license procedure was no major obstace to trade.

It's true that for the past year or more, goods now being placed under general license were readily available for purchase by the Soviet bloc under special license. And these items, reportedly, were routinely okayed for shipment. Actually, too, the 700 commodities make up only a small fraction of total U. S. exports to the Soviet area.

It'll be a different story, many believe, if Commerce adds to the GLSA list some of those chemicals that now require a validated license.





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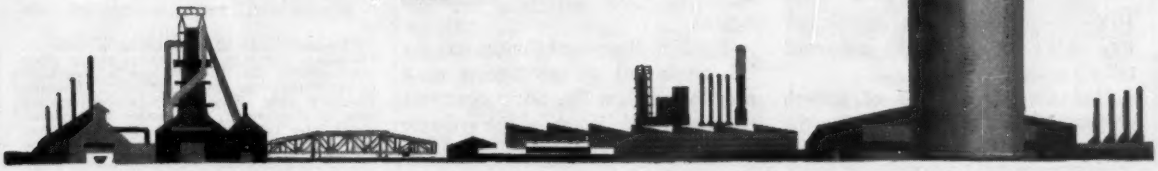

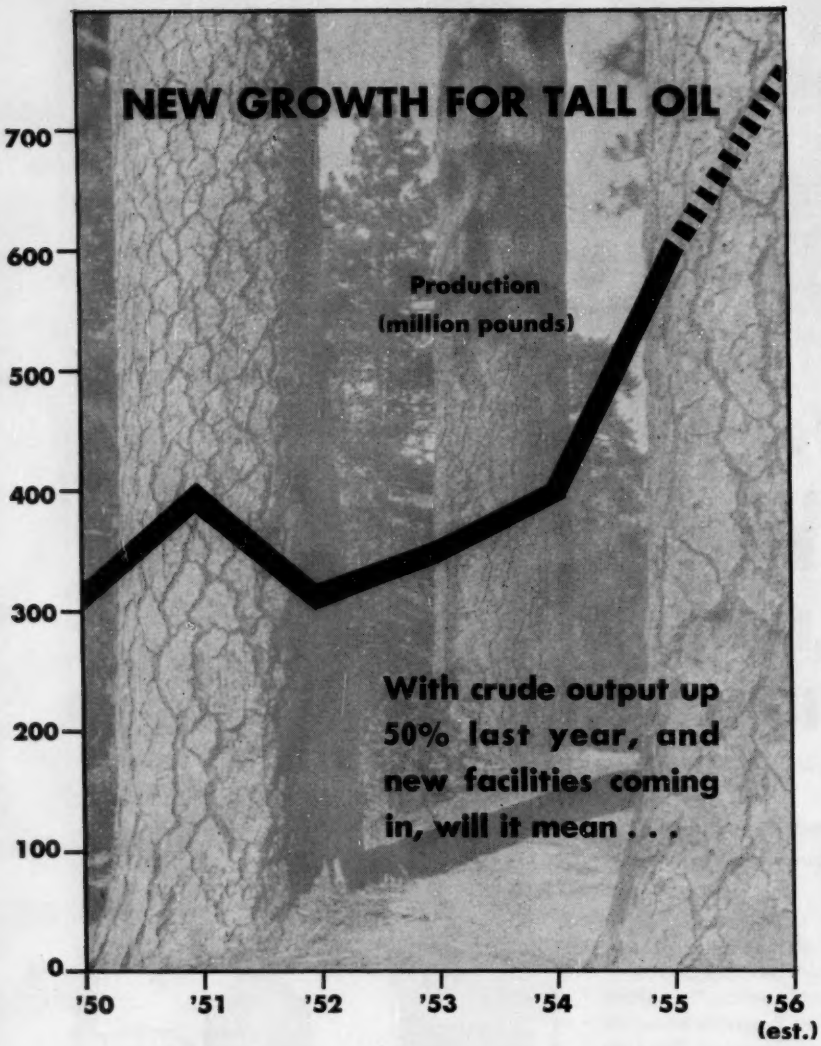

750 Million Lbs. by '57?

As late as last fall some market observers were forecasting a tall oil output of 600 million lbs./year by 1960. But actually, total U.S. tall oil production for '55 climbed close to —if not over—that predicted figure, is expected to hit 750 million lbs./ year by the end of this year.

Why has much of the recent tall oil forecasting been on such slippery footing? One reason: many marketers obviously were sticking to a "safe" 10%-per-annum industrial growth factor, didn't anticipate the enlivened tall oil activity in '55.

Had the '52-'54 rate of growth continued steadily through '60, the forecast would have been reasonably accurate. But in '55, output of crude tall oil increased a full 50% over the previous year; and it's expected to keep growing at this accelerated pace through this year, then taper off somewhat in '57.

Who's Right? But there are other reasons why marketers have trouble knowing what is going on in the industry. For example, it's difficult to find two independent sources that agree on past annual production figures.

The U.S. Bureau of Census sets the '55 crude tall oil production at a near 549 million lbs. Some observers have cautiously increased the estimate to 580 million, and the Tall Oil Division (formerly Tall Oil Assn.) of Pulp Chemicals Assn. boldly says it was 600 million lbs.

Even a cursory examination of these figures indicates one fact: any estimates that place last year's output much below 550 million lbs. are obviously far out of line.

But the 50-million-lbs. difference between the Census Bureau and Tall Oil Division tallies requires a closer look.

Spokesmen for the latter organization explain it simply by saying that the government agency does not report all tall oil production, and, in particular, leaves out a significant amount of captive material.

How does the Bureau of Census react? Far from refuting the explanation, government representatives go right along with it, in fact suggest that even the Tall Oil Division's total may not include all U.S. tall oil production.

Incidentally, the Tall Oil Division's production figures have exceeded Census figures for the past three years, though prior to '53 the situation was reversed—the government agency then included production not considered by the Tall Oil Assn. The compromise production curve (*see chart*) is, therefore, based on Census data for the '50-'52 period, and on Tall Oil Division data for subsequent years.

Thus, government and industry representatives do not actually disagree about the amount of tall oil being produced, only differ in the manner of reporting.

This holds true for future output predictions as well. Commenting on the Tall Oil Division's startling output estimate of 750 million lbs. of crude tall oil in '56, Census Bureau analysts say, "It's an entirely reasonable expectation in light of current expansions in the industry."*

Note, however, that not all the current expansions will add poundage to total U.S. output of tall oil since some units are just refineries. But increasing availability of improved refined tall oil products is—and will continue to be —largely responsible for rapid growth of the industry.

Meanwhile, new techniques are

*Arizona Chemical is building a plant in Louisiana, will have 50% greater output when it's completed next year; Glidden will construct a 50,000-tons/year unit in Florida; Hercules Powder's new 35,000-tons/year fractionating plant is about ready, and another will be completed later this year; Union Bag and Paper and West Virginia Pulp and Paper are also expanding facilities.

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boosting the efficiencies of existing installations, materially add to the nation's over-all tall oil capacity.

End-use Hodgepodge: Though such conflicting production estimates can easily be resolved, the working-out of a meaningful end-use breakdown pattern is far more troublesome.

Says one tall oil expert: "There just isn't any reliable way of knowing how much tall oil goes into each of a host of applications. Many tall oil producers make no real attempt to keep accurate records on the ultimate uses of their product; sales managers are forced to make off-hand estimates that could be wrong by a large margin. Consequently, we do not even try to derive an accurate breakdown."

Government-compiled statistics are helpful, of course, but contain many points of uncertainty.

For example, the Bureau of Census breaks down tall oil uses into numerous groupings, lists uses of crude and refined tall oils separately. But almost a score of the indicated uses are merely footnoted "not shown, to avoid disclosure of figures for individual companies."

Furthermore, changes in the manner of reporting, in 1955, put market researchers at an even greater disadvantage.

Beginning in January of last year, consumption data for refined tall oil excluded distilled and fractionated tall oil (low-rosin fatty acids—with a rosin content of 20% or less), which earlier series listed.

But that's not all. Consumption of tall oil in linoleum manufacture—one of the major end-uses—was previously reported under the classification "linoleum and oilcloth"; now these data have lost their identity, are lumped in the "other inedibles" class. (During the first half of '55, consumption in linoleum making was provided in footnote form, but this practice was soon dropped.)

Too, the original "chemicals" use classification has been eliminated; and tall oil going into such applications is now also included in "other inedibles."

Moved out of the "other inedible" group and listed under "lubricants and similar oils" is tall oil use in core coils, cutting oils, brake fluids, dielectric oils, metal working. Comparison of current and past data is, therefore, further complicated.

Census vs. Ag: The U.S. Dept. of Agriculture also reports an end-use breakdown on tall oil consumption, but entirely in terms of crude material. And because this agency obtains most of its information from the Bureau of Census, good agreement between the two would be expected.

Yet there are significant differences. For example, USDA data for '54 indicates 20 million lbs. of crude tall oil used for resins, 40 million lbs. for paints and varnishes. For the same year, Census reported the use of only 4.2 million lbs. of refined—no crude—for resins, 1.2 million lbs. of crude plus 21.8 million lbs. of refined tall oil for paints and varnishes.

There are two reasons for the differences: (1) In an effort to simplify the over-all end-use pattern, USDA combines into one category items listed separately by the Bureau of Census; (2) USDA derives its own estimates for listings not in Bureau of Census reports.

It means, then, that neither source is necessarily incorrect, wholly or in part. Nonetheless, many marketers would like to see other changes in the listings. Though both government agencies derive approximately the same figures for tall oil used to make soaps, some observers feel this data should include many other items now grouped elsewhere. Such a reclassification would increase greatly—perhaps double—the amount of tall oil now reportedly going into soaps.

But here's how USDA viewed the tall oil picture last year: production of crude tall oil, 550 million lbs.; exports, 48 million; domestic disappearance, 447 million; soap, 14 million; paint and varnish, 40 million; linoleum and oilcloth, 31 million; resins, 13 million; other drying oil products, 38 million; other nonfood uses, 313 million; foots (residue) and loss, 27 million.

But regardless of whether this breakdown or some other one—based on different groupings, or assuming the higher 600-million-lbs. production figure—is selected, there should be agreement on one point. Tall oil production is fast catching up with the theoretical limits imposed by pulp and paper processing, and ultimately, future growth will more nearly be tied to expansions in the latter industry.

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Agency—Compton Adv., Inc.
AMERICAN AGRICULTURAL CHEMICAL CO., THE 72
Agency—Donahue & Coe, Inc.
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Agency—The McCarty Co.
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Agency—The House of J. Hayden Twiss
ATLANTIC REFINING CO. 34
Agency—N. W. Ayer & Son, Inc.
ATLAS POWDER CO. 38, 39
Agency—The Aitken Kynett Co.
BAKER CHEMICAL CO., J. T. 41
Agency—Wildrick & Miller, Inc.
BARNEBY-CHENEY CO. 92
Agency—Byer & Bowman, Adv.
BEACON CHEMICAL INDUSTRIES, INC. .. 64
Agency—Mina Lee Simon
BEMIS BRO. BAG CO. 31
Agency—Gardner Adv. Co.
BERKSHIRE CHEMICALS, INC. 102
Agency—Glvaudan Adv., Inc.
BIRD MACHINE CO. 69
Agency—Walter B. Snow & Staff, Inc.
BUFLOVAK EQUIPMENT DIV., BLAW KNOX CO. 62
Agency—Ketchum, MacLeod & Grove, Inc.
BUTLER MFG. CO. 42
Agency—Aubrey, Finlay, Marley & Hodgson, Inc.
CARBIDE & CARBON CHEMICALS CO. DIV. OF UNION CARBIDE & CARBON CORP. 98
Agency—J. M. Mathes, Inc.
CELANESE CORP. OF AMERICA 43
Agency—Ellington & Co., Inc.
CHEMICAL ENGINEERING 70, 71
CHURCH & DWIGHT CO. 96
Agency—J. Walter Thompson Co.
COYLE LINES, INC. 86
Agency—Sewell, Cairo & Fadiauer, Inc.
DAVIES NITRATE CO. 82
Agency—Malcolm Severance Co.
DAVISON CHEMICAL CO. 77
Agency—St. Georges & Keyes, Inc.
DELTA CHEMICAL WORKS 92
Agency—Miller Adv. Agency, Inc.
DOW CHEMICAL CO., THE 33, 83
Agency—MacManus, John & Adams, Inc.
DRACCO CORP. 91
Agency—Jayme Organization, Inc., The
DU PONT DE NEMOURS & CO., INC. E. I., ELECTROCHEMICAL DEPT. .. 88, 89
Agency—Batten, Barton, Durstine & Osborne, Inc.
DURIRON CO., THE 47
Agency—Kircher, Helton & Collett, Inc.
EASTERN STATES PETROLEUM CO., INC. 3
Agency—Ruthraff & Ryan, Inc.
EASTMAN CHEMICAL PRODUCTS, INC. .. 12
Agency—Fred Wittner, Adv.
EMPIRE TRUST CO. 90
Agency—Doremus & Co.
ENJAY CO., INC. 61
Agency—McCann-Erickson, Inc.
FANSTEEL METALLURGICAL CORP. 50
Agency—Symonds, MacKenzie & Co., Inc.
FERGUSON CO., THE H. K. 25
Agency—The Bayless-Kerr Co.
FULTON BAG & COTTON MILLS 105
Agency—Fitzgerald Adv. Agency
GENERAL AMERICAN TRANSPORTATION CORP., WIGGINS GASHOLDER DIV. .. 79
Agency—Weiss & Geller, Inc.
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Agency—Fuller & Smith & Ross, Inc.
HEYDEN CHEMICAL CORP. ..... 4th Cover
Agency—Sommers-Davis, Inc.
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Agency—C. Franklin Brown, Inc.
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Agency—Vansant, Dugdale & Co., Inc.
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Agency—Landsheft, Inc.
LUMMUS CO., THE 8
Agency—G. M. Basford Co.
McKESSON & ROBBINS, INC. 86
Agency—Ellington & Co., Inc.
McLAUGHLIN GORMLEY KING CO. 82
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EMPLOYMENT 105, 106, 107
EQUIPMENT: Used/Surplus New For Sale 107
MANAGEMENT SERVICES 108
SPECIAL SERVICES 107

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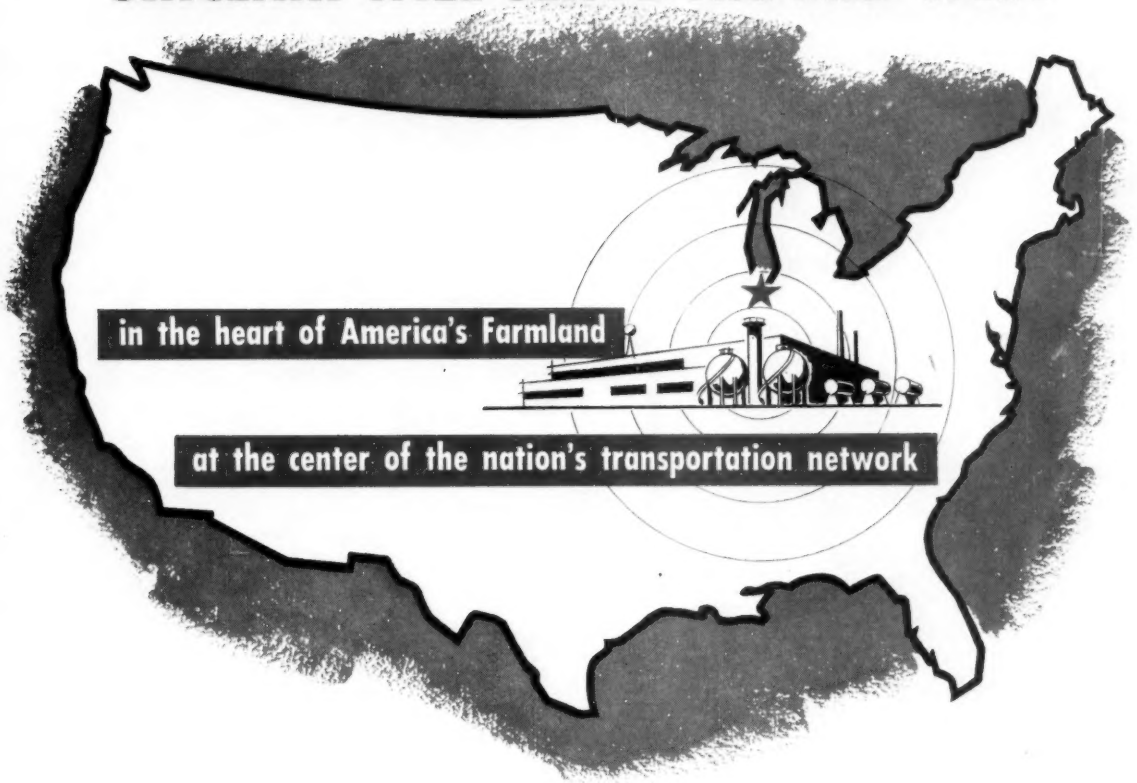

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